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WORLD OIL OUTLOOK

HEARINGS

BEFORE THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

FIRST SESSION

ON THE

WORLD OIL OUTLOOK

JANUARY 22 AND MARCH 11, 1987

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WORLD OIL OUTLOOK

THURSDAY, JANUARY 22, 1987

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:40 a.m., in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The CHAIRMAN. The hearing will come to order.

According to the Petroleum Intelligence Weekly of January 19, 1987, and I quote, "The drop in crude oil and natural gas liquids output by year end was about one million barrels a day from its February 1986 peak." We can measure the drop in crude oil in various ways. We can include natural gas liquids and we can include imports of product; but however you measure it, the figures in my view are absolutely alarming.

At the same time that domestic production is going down, and going down at a very rapid rate, consumption is going up. It is somewhere in the neighborhood of 2 to 8 percent per year. In 1973 when we faced the terrible oil embargo and the gas lines and the quadruppling of price overnight, we were dependent on imports for only 39 percent of our supply.

At the rate we are going, in five years we will be dependent on imports for at least 55 percent. If you extrapolated the line of the last 12 months' decline, it would be much more than that.

So what we are facing, in my view, is a situation much more difficult than in 1973 when price quadrupled, and much more difficult than in 1979 during the Iranian situation when price more than doubled overnight. In effect, what we seem to be doing is sewing the seeds for the next crisis, the next crisis being even more difficult than the last two.

In addition to the fact that our production is going down, our ability to produce because of the fact that we are dismantling our domestic production and exploration capability seems to me to be especially disturbing. Geologists are either not going to school, are not being graduated, or are turning from geology to another line of work. Mud companies, helicopter companies, drill bit companies, pipe manufacturing companies, all of that plethora of service industries that make possible the drilling of wells in the United States are being dismantled bit by bit, piece by piece, and rapidly so, at the same time that drilling is going down every year.

There are some hopeful signs on the horizon in terms of the ability to preserve a domestic industry such as the increase in price. That would be regarded as a very negative sign by consumers, of course, but in terms of the ability to produce, a very hopeful sign. Whether or not that will hold together is very much a chancey question. My own view is that it will not, at least not over a period of six months or so.

In any event, we are here today to examine the world oil situation to determine whether present trends will continue and what the implication of those trends is. We have two witnesses that I believe are peculiarly able to give us advice on whether we ought on the one hand to rely upon the invisible hand to let the comparative advantage of the Middle East produce the oil while we dismantle the domestic industry—which is admittedly much more expensive—or whether we ought to do something else about it.

[The prepared statement of Senator Johnston follows:]

Opening Statement by Senator Johnston

Oversight Hearing on World Oil Outlook
January 22, 1987

I am pleased to convene today's hearing on the "World Oil Outlook".

Let me paint the picture I see facing us today.

Domestic crude oil production plummeted last year, going from 9.056 million barrels per day in January, 1986, to 8.350 million barrels per day in January, 1987. If you add in natural gas liquids, we lost a million barrels per day of production last year.

The situation is likely to continue to deteriorate. Oil producers -- majors and independents alike -- were forced to make drastic cuts in their exploration budgets last year when their cash flow dried up. They are not likely to forget the lessons of 1986 any time soon. And even if they tried to forget, their investors and bankers would not let them.

Prices have come back up to an average near $17 per barrel in the last month since the OPEC members agreed to a new production ceiling of 15.8 million barrels a day. But that agreement could fall apart with cheating by those who have cheated in the past. The Saudis are clearly ready retaliate against cheaters and the tailspin could start again.

But even if the agreement holds, an $18 world oil price doesn't put Humpty Dumpty back together again. No producer I know of is planning an exploration budget increase based on $18 oil. They simply hope to tread water and not go under.

Less exploration leads inevitably to less production. A simple 3% annual decline in domestic production would mean that we would be producing 7.128 million barrels per day five years from now.

The other side of the equation shows increased demand. A simple 2% annual increase in demand would take our needs from 14.5 to 16 million barrels per day in five years. The gap between production and demand would have to be filled by imports. Imports under those assumptions (8.872 mb/d) would be 55% of our supply. And those are very conservative assumptions.

In 1973, domestic production averaged 9.2 million barrels per day; net imports were 6.0 million barrels per day for an import dependence level of 39.4%.

The first week of this year shows domestic crude production at 8.3 million barrels per day (as I've mentioned) and net imports at 5.4 mb/d -- up 13% from a year ago -- for an import dependence level of 39.4%, the same percentage as in 1973.

It's easy to sit back and relax and let the invisible hand guide our energy policies.

It's also dangerous. For if we have learned anything in the last year it must be that oil markets are fundamentally unstable.

Volatility is the watchword of the day.

With armies in Iran and Iraq staring down each others' gunsights, we must pay attention to the Middle East.

We must pay attention to OPEC. For nowhere else are oil reserves of any significance available and ready to be produced. Even more significantly, there is no other place in the world where the reserves are so big and the cost of production so small. It is highly unlikely that there are any more such oil deposits left to be discovered anywhere. Persian Gulf oil almost certainly will be the world's most abundant and least costly conventional reserve for the remainder of the oil era.

We must pay attention to our domestic oil industry. I personally believe that an oil import fee would go a long way towards solving many of the ills of our domestic industry, while helping us to keep our dependence in line. I still hope that we can garner some additional support for that idea. Falling short of that, we must look for other ideas and solutions.

As Chairman of this Committee, I intend to seek the advice and counsel of those who have expertise in the subject and who have experience dealing with these issues. We could not have two more qualified witnesses than Jim Schlesinger and Jim Akins.

We have asked them to give us their interpretation of recent events, and to tell us what they would suggest we do.

The CHAIRMAN. Our first witness is no stranger to this committee. Indeed, he is a close friend of mine and of other members of this committee, a very distinguished Secretary of Energy under Jimmy Carter. At that time, we had chaos in the gas markets, and Secretary Jim Schlesinger, with help from some of us, produced what I think was a triumph of legislation, recognizing all its faults. The Natural Gas Policy Act really turned the country around in terms of natural gas and doing away with the dual market of interstate and intrastate, where there was a lot of gas in intrastate and no gas in interstate.

In any event, Secretary Schlesinger put that together. He has also been a distinguished Secretary of Defense, serving under Carter, serving under Nixon, his abilities recognized under both. He has been a Director of the CIA, and he was trained as an economist. So he is in a particularly good situation to testify today.

Our other distinguished witness is by trade a career Foreign Service officer. I first met him in Jidda, Saudi Arabia, when he was Ambassador to Saudi Arabia. He is generally regarded, and certainly regarded by me, as being one of the quintessential experts on the Middle East, OPEC, and petroleum. I think he is one of the really good thinkers in these areas.

We are very privileged to have Ambassador Jim Akins with us today.

So if we may lead off first with Secretary Schlesinger, whom I understand has to leave——

Senator EVANS. Mr. Chairman?

The CHAIRMAN [continuing]. I would be delighted now to recognize my colleagues for opening statements, if they would like.

Senator Evans.

STATEMENT OF HON. DANIEL J. EVANS, A U.S. SENATOR FROM THE STATE OF WASHINGTON

Senator EVANS. Thank you, Mr. Chairman.

I would ask consent that a full statement be entered into the record.

The CHAIRMAN. Without objection.

Senator EVANS. Let me just briefly quote from it.

Mr. Chairman, I think that our country is headed for a real energy problem, and much faster than most of us believe. We are running blindly on a track that is leading to increasing vulnerability to unstable Middle Eastern supplies, and inevitably—maybe not tomorrow, maybe not the next day—but sometime in the near future, substantially higher prices for petroleum energy.

Inflation, crippling of our economy, all could occur as it did in the early 1970s unless we act smarter than we did then. As energy policy makers, I believe we should abandon talk of just the free market in world energy markets. Oil is a valuable strategic commodity that is traded in world markets. It has an essential geopolitical meaning to those countries in the Persian Gulf who are members of OPEC. Swing producers such as Saudi Arabia with surplus capacity can easily move the world oil market when it suits them.

One day its objective may be imposing discipline on the so-called cheaters in the cartel; another day it may be increasing revenues to a government that has incurred increasing obligations to its society.

Whatever it is, it certainly is not in the strategic interest of the United States.

Mr. Chairman, I hope this Committee and others in Congress will take decisive steps over the next several months to give our country some direction in energy policy. The Administration's budget at least for fiscal year 1988 shows clearly that it is not taking a leadership role. It proposes substantial reductions in most R&D programs into alternative fuels. It also greatly reduces the conservation R&D budget in valuable areas such as building retrofits, industrial conservation, transportation efficiencies, besides proposing to eliminate the conservation grant program.

I believe we should be headed in most of these areas in the opposite direction. Increased energy efficiencies offer one of the cheapest, readily available energy resources our country has, and it is domestic in nature. I am pleased to co-sponsor with the Chairman a bill that will finally establish consistent and uniform electric appliance efficiency standards, as one small move in that direction.

Finally, let me simply state that I believe that today is not the time to repeal automobile fuel efficiency standards. In fact, I believe we probably should be moving in exactly the opposite direction. The statute itself provides several criteria justifying the need for fuel efficiency standards. They include the Nation's need to conserve energy, and the technological feasibility of achieving those standards. On both counts, we can and should meet those requirements.

With increasing vulnerability to unsecured foreign sources, and higher prices coming along, the national need test certainly is met. Auto makers both here and abroad have clearly demonstrated the technology to go substantially beyond the 27.5 mile per gallon standard.

Mr. Chairman, I would hope that during the next several months we would take a look at the wide variety of regulatory and tax changes which may have some impact to either increase energy supplies or to preserve those which we now have. Each of us has a specific interest in a particular source of fuel.

Let me say that I believe that all of these proposals should be put on the table and considered in a comprehensive way. Let us find out which are the most cost-effective, which are the most environmentally sound, debate the pros and cons, invite expert witnesses. The one thing that I hope this Committee does not do is just sit back and allow future historians to look back and say, why did we do so little when we still had a chance?

[The prepared statement of Senator Evans follows:]

REMARKS BY SEN. DANIEL J. EVANS ON HEARINGS ON WORLD OIL SITUATION

SENATE ENERGY AND NATURAL RESOURCES COMMITTEE
JANUARY 22, 1987

MR. CHAIRMAN, I COMMEND YOU FOR HOLDING THESE HEARINGS EARLY IN THIS SESSION OF CONGRESS. THE CLOSED BRIEFING ON TUESDAY WAS VERY INFORMATIVE. TODAY'S SESSION SHOULD ALSO PROVE TO BE INTERESTING AND FOCUS SOME BADLY NEEDED ATTENTION ON OUR NATION'S LACK OF A COHERENT ENERGY POLICY. I MIGHT ADD THAT THE CHAIRMAN SHOWS REMARKABLE FORESIGHT IN SCHEDULING HEARINGS TO COINCIDE WITH THE CURRENT INTENSIFICATION OF THE IRAN-IRAQI CONFLICT.

OUR COUNTRY IS HEADED FOR REAL ENERGY PROBLEMS. WE ARE RUNNING BLINDLY ON A TRACK THAT IS LEADING TO INCREASING VULNERABILITYTON UNSTABLE MIDDLE EASTERN SOURCES AND INEVITABLE HIGHER PRICES. SUPPLY SHORTAGES COULD EASILY PLAGUE OUR ECONOMY ONCE AGAIN AS THEY DID IN THE 1970'S. INFLATION COULD SHOOT UP QUICKLY AGAIN AS OIL PRICES RISE. ADD THAT TO THE FURTHER DEPRECIATION OF THE U.S. DOLLAR AND YOU HAVE A PRESCRIPTION FOR EXTRAORDINARY ECONOMIC TROUBLES.

THE DOMESTIC ENERGY SUPPLY SITUATION ISN'T ENCOURAGING, EITHER. MY COLLEAGUES FROM THE OIL-PRODUCING STATES WILL STATE THE MOST RECENT OIL RIG COUNT FOR THE INDUSTRY -- WHATEVER IT IS LAST WEEK, IT IS FAR BELOW THE LEVEL OF A YEAR OR TWO AGO. HIGH-COST U.S. PRODUCERS AND STRIPPER WELLS ARE BEING SQUEEZED OUT OF THE MARKET BY THE LOWER OIL PRICES. AND NEW SUPPLIES OF PETROLEUM ARE NOT BEING DISCOVERED, EITHER IN THE LOWER 48 OR ALASKA, AT A RATE CONSISTENT WITH CURRENT CONSUMPTION LEVELS. EVEN THE DOE ACKNOWLEDGES, IN TESTIMONY BEFORE OUR COMMITTEE LAST SEPTEMBER, THAT MOST OF THE SURPLUS OIL PRODUCTION CAPACITY IS IN OPEC COUNTRIES -- 47 PERCENT ALONE IN SAUDIA ARABIA.

AS ENERGY POLICYMAKERS, WE SHOULD ABANDON TALK OF THE "FREE MARKET" IN WORLD ENERGY MARKETS. OIL IS A VALUABLE STRATEGIC COMMODITY THAT IS TRADED IN WORLD MARKETS. IT HAS AN ESSENTIAL GEO-POLITICAL MEANING TO THOSE COUNTRIES IN THE PERSIAN GULF WHO ARE MEMBERS OF OPEC. SWING PRODUCERS SUCH AS SAUDI ARABIA WITH SURPLUS CAPACITY CAN EASILY MOVE THE WORLD OIL MARKETS WHEN IT SUITS THEM. ONE DAY, ITS OBJECTIVE MAY BE IMPOSING DISCIPLINE ON THE SO-CALLED "CHEATERS" IN THE OPEC CARTEL; ANOTHER DAY IT MAY BE INCREASING REVENUES TO A GOVERNMENT THAT HAS INCURRED INCREASING OBLIGATIONS TO ITS SOCIETY. WHATEVER IT IS, IT IS NOT THE STRATEGIC INTERESTS OF THE UNITED STATES.

MEANWHILE, OUR CONSUMPTION OF PETROLEUM PRODUCTS AND OTHER FORMS OF ENERGY IS INCREASING RAPIDLY. WHY NOT? IT'S CHEAP AND PLENTIFUL. CARS ARE GETTING BIGGER AND LESS FUEL-EFFICIENT. HOMEOWNERS WORRY LESS ABOUT INSULATING THEIR HOUSES. COMPLACENCY PUTS PAST FEARS OF SHORTAGES AND HIGH PRICES TO SLEEP. OUR GOVERNMENT DOES LITTLE TO HALT THIS. IN FACT, A TASK FORCE PROPOSES TO REPEAL THE AUTO FUEL EFFICIENCY STANDARDS THAT HAVE

SAVED MILLIONS OF BARRELS OF OIL IMPORTS OVER THE PAST DECADE. WHILE WE SLUMBER, THE MIDDLE EAST IS IN TURMOIL. WHILE WE ARE LULLED INTO A FALSE SENSE OF COMPLACENCY, THE WORLD OIL MARKETS ARE POISED ON THE EDGE OF INSTABILITY.

MR. CHAIRMAN, I HOPE THIS COMMITTEE AND OTHERS IN CONGRESS WILL TAKE DECISIVE STEPS OVER THE NEXT SEVERAL MONTHS TO GIVE OUR COUNTRY SOME DIRECTION IN ENERGY POLICY. THE ADMINISTRATION'S BUDGET FOR FISCAL YEAR 1988 SHOWS CLEARLY IT WILL NOT TAKE A LEADERSHIP ROLE. IT PROPOSES SUBSTANTIAL REDUCTIONS IN MOST R&D PROGRAMS INTO ALTERNATIVE FUELS. IT ALSO GREATLY REDUCES THE CONSERVATION R&D BUDGET IN VALUABLE AREAS SUCH AS BUILDING RETROFITS, INDUSTRIAL CONSERVATION, TRANSPORTATION EFFICIENCIES, BESIDES PROPOSING TO ELIMINATE THE CONSERVATION GRANT PROGRAMS. THE FEDERAL GOVERNMENT SHOULD BE HEADED IN THE OPPOSITE DIRECTION. INCREASED ENERGY EFFICIENCIES OFFER ONE OF THE CHEAPEST, READILY-AVAILABLE ENERGY RESOURCES OUR COUNTRY HAS. I AM PLEASED TO COSPONSOR WITH THE CHAIRMAN A BILL THAT WILL FINALLY ESTABLISH CONSISTENT AND UNIFORM ELECTRIC APPLIANCE EFFICIENCY STANDARDS. I HOPE WE CAN MOVE THAT BILL QUICKLY NEXT WEEK AND GET IT ENACTED INTO LAW.

FINALLY, LET ME SIMPLY STATE THAT TODAY IS NOT THE TIME TO REPEAL CAFE STANDARDS. IN FACT, I BELIEVE WE SHOULD INCREASE THEM. THE STATUTE SPECIFIES SEVERAL CRITERIA JUSTIFYING THE NEED FOR CAFE STANDARDS, SUCH AS THE NATION'S NEED TO CONSERVE ENERGY AND THE TECHNLOGICAL FEASIBILITY OF ACHIEVING THE STANDARD. ON BOTH COUNTS, WE NEED THEM. WITH INCREASING VULNERABILITY TO UNSECURE FOREIGN SOURCES AND HIGHER PRICES, THE "NATIONAL NEED" TEST IS MET. AND AUTOMAKERS, BOTH HERE AND ABROAD, HAVE DEMONSTRATED THE TECHNOLOGY TO GO SUBSTANTIALLY BEYOND A 27.5 MPG STANDARD. I HOPE THIS COMMITTEE AND THE CONGRESS WILL TAKE A HARD LOOK AT THIS ISSUE IN THE NEXT FEW MONTHS.

MR. CHAIRMAN, OTHERS ON THIS COMMITTEE WILL ADVOCATE TAX AND REGULATORY CHANGES TO INCREASE SOURCES OF ENERGY SUPPLIES. EACH OF US HAS A SPECIFIC INTEREST IN A SPECIFIC SOURCE OF FUEL. LET ME SAY THAT I BELIEVE ALL OF THESE PROPOSALS SHOULD BE PUT ON THE TABLE AND CONSIDERED IN A COMPREHENSIVE WAY. LET'S FIND OUT WHICH ONE IS THE MOST COST-EFFECTIVE AND ENVIRONMENTALLY SOUND. LET'S DEBATE THE PRO'S AND CON'S, INVITE EXPERT WITNESSES, MODIFY THE PROPOSALS IN TRYING TO DEVELOP A CONSENSUS. BUT LET'S TAKE SOME ACTIONS TO IMPROVE OUR COUNTRY'S LONG-TERM ENERGY SECURITY LEST FUTURE HISTORIANS LOOK BACK AND WONDER WHY WE DID SO LITTLE WHEN WE HAD THE CHANCE.

The CHAIRMAN. Senator Evans, thank you very much for a very thoughtful statement. Let me say that whether or not we are able to recommend or get enacted into law the proper solutions, at least history will say that we sounded the toxin and were ready with the problem.

The Senator from New Mexico.

STATEMENT OF HON. JEFF BINGAMAN, A U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator BINGAMAN. Thank you, Mr. Chairman.

Let me just make it very brief. I also have a statement that I would like entered into the record.

I am looking forward to the testimony in this series of hearings. I think you and Senator Evans have very well stated the seriousness of the problem, and it is a problem which is clearly not on the national agenda.

The Administration does not see it as a difficulty that needs governmental attention, and I think clearly that is a mistake in judgment on their part. I commend you for taking the leadership role in focusing attention on this, and I hope we can legislate in this area and do so meaningfully in this 100th Congress.

[The prepared statement of Senator Bingaman follows:]

Jeff Bing

STATEMENT BY SENATOR JEFF BINGAMAN
WORLD OIL OUTLOOK HEARING
January 22, 1987

I thank Chairman Johnston for holding this first in a series of hearings to focus on the crisis facing our domestic oil and gas industry. I strongly support his efforts to heighten public understanding of how one of our most important domestic industries is seriously threatened.

It is clear we must do a better job of educating the public and the Administration of the serious implications for the economic well-being and national security of the nation if the current crisis in our doemstic oil and gas industry is allowed to continue. My view is that a strong, profitable domestic oil and gas industry is vital to this nation and certainly to the state of New Mexico.

Consider what has happened in my state. New Mexico is the fifth largest oil and gas producing state in the nation in terms of total quantity and has suffered from the decline of oil and gas prices. Revenues generated by the industry showed a 25 percent drop in 1986. The total value of New Mexico's oil and gas activity has dropped 46 percent in the past year. Employment by the industry dropped from a low of 13,200 in 1985 to 9,000 in October of 1986. The number of drilling rigs are down to an average of 29 compared with 71 last year. And of the states' bankruptcies, estimated to be 2,500 for 1986, one fourth occurred in those counties where most of the state's oil and gas is produced. Clearly, effective action is needed to correct the decline of the industry.

Today's hearing will focus on how international events and actions affect what happens in our domestic industry.

The important step we must take next is to determine what an effective national energy strategy or policy should be -- a policy that is good for the entire country -- not just oil-producing states.

Regardless of the statements by the Administration, the strategic interests of our nation are clearly at risk if we do not take effective action in the near future. I look forward to the testimony of today's distinguished witnesses and to their recommendations and to future hearings.

The CHAIRMAN. Thank you, Senator Bingaman.

Senator Hecht.

STATEMENT OF HON. CHIC HECHT, A U.S. SENATOR FROM THE STATE OF NEVADA

Senator HECHT. Thank you, Mr. Chairman.

When I first got on the committee again this year, your staff director came in and spoke to me and asked me what I thought was the number one issue facing the Committee this year, and I said the lack of oil and the future planning to get oil, because we are running out of oil very, very fast.

It is not enough to have good intentions. It is not enough to try and do things. We have to get something done. We have got this two-year cycle right now. Someone once said, the road to hell is paved with good intentions. We have to do more than have good intentions. We have to address the issue. We have to come up with this issue. So I hope that you will pursue this this year.

The CHAIRMAN. Thank you very much, Senator Hecht.

Senator McClure is on his way in trying to get here. He intends to be here, but he has a written statement, in the meantime, which we will put in the record at this point.

[The prepared statement of Senator McClure follows:]

OPENING STATEMENT
OF
THE HONORABLE JAMES A. McCLURE (R-ID)
AT THE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
OVERSIGHT HEARING
ON
THE WORLD OIL OUTLOOK
JANUARY 22, 1986

GOOD MORNING. AS MY COLLEAGUES ARE AWARE, AS CHAIRMAN I DEVOTED CONSIDERABLE COMMITTEE TIME TO THE SUBJECT OF THESE HEARINGS -- THE WORLD OIL OUTLOOK. I WANT TO COMMEND CHAIRMAN JOHNSTON FOR HOLDING THIS OVERSIGHT HEARING. IT IS IMPORTANT FOR THE MEMBERS OF THIS COMMITTEE TO KEEP APPRISED OF THE LATEST DEVELOPMENTS IN THE DOMESTIC AND INTERNATIONAL OIL MARKETS, AND THE IMPLICATIONS OF THOSE CHANGES FOR THE UNITED STATES' ENERGY, ECONOMIC AND NATIONAL SECURITY.

THE CHOICE POLICYMAKERS FACE TODAY IS AKIN TO THAT OF WHETHER OR NOT TO TAKE OUT CATASTROPHIC HEALTH INSURANCE: DO WE WANT TO SIGN UP AND MAKE THE NECESSARY PREMIUM PAYMENTS, OR DO WE DO NOTHING AND SIMPLY HOPE THAT DISASTER WILL NEVER STRIKE?

THE CASUAL OBSERVER OF THE INTERNATIONAL OIL MARKET WRONGLY CONCLUDES THAT THE CURRENT SITUATION POSES NO THREAT TO OUR NATION. MANY HELD A SIMILAR VIEW IN THE EARLY 1970'S, BUT THAT WAS QUICKLY DISPELLED BY THE 1973 ARAB OIL EMBARGO WHICH LED TO SERIOUS ECONOMIC DISRUPTIONS AND UNFORGETTABLE GASOLINE LINES.

WITH THE SURPLUS OF OIL ON THE WORLD MARKET AND PRICES BELOW LEVELS TO WHICH WE HAD BECOME ACCUSTOMED, MANY PEOPLE HAVE LOST SIGHT OF THE FACT THAT THE OIL MARKET IS NOT ONLY VERY FRAGILE, BUT IT IS ALSO

CONTROLLED BY OTHERS. THEY HAVE FORGOTTEN THAT THE INDUSTRIALIZED WORLD IS HIGHLY DEPENDENT ON IMPORTED PETROLEUM. THEY HAVE FORGOTTEN THAT THE MIDDLE EAST HOLDS TWO-THIRDS OF THE FREE-WORLD'S PROVEN OIL RESERVES WHILE INDUSTRIALIZED NATIONS ACCOUNT FOR TWO-THIRDS OF THE FREE-WORLD'S OIL CONSUMPTION. AND THAT THERE IS AN INCREASINGLY ACTIVE WAR BETWEEN IRAQ AND IRAN WHICH COULD DISRUPT A PROPORTIONATELY SMALL YET SIGNIFICANT PERCENTAGE OF THE FREE-WORLD'S OIL SUPPLY WITHOUT A MOMENTS NOTICE. AND THEY FORGET THAT WHAT CAN INTENTIONALLY BE DRIVEN DOWN BY OPEC PRODUCERS CAN INTENTIONALLY BE DRIVEN UP BY THEM AS WELL.

SOME POINT OUT THAT LAST YEAR THE UNITED STATES WAS NO MORE DEPENDENT THAN WE WERE JUST PRIOR TO THE 1973 ARAB OIL EMBARGO--AS IF THAT SHOULD BE SOME COMFORT. HOWEVER, THAT COMPARISON IGNORES THE UNDERLYING TREND OF DETERIORATION IN OUR DEPENDENCE PICTURE.

SINCE 1973, U.S. CRUDE OIL PRODUCTION HAS FALLEN FIVE PERCENT AND LOWER-48 CRUDE PRODUCTION IS DOWN BY TWENTY-FOUR PERCENT. ACCORDING TO DEPARTMENT OF ENERGY DATA, U.S. CRUDE OIL PRODUCTION IN 1986 WAS DOWN 3.3 PERCENT FROM THE PREVIOUS YEAR, BUT CONSUMPTION WAS UP 2.7 PERCENT. AND ACCORDING TO DOE'S MOST RECENT LONG-TERM ENERGY FORECAST, U.S. FOREIGN OIL DEPENDENCY MAY GROW TO AS MUCH AS 60 PERCENT BY 1995, NEARLY TWICE TODAY'S LEVEL OF DEPENDENCE.

WHILE IN THE SHORT-TERM THE FALL IN OIL PRICES IS A BOON TO CONSUMERS AND OUR ECONOMY, IT CAN BE A LONG-TERM ENERGY SECURITY DISASTER. WORLD-WIDE EXPENDITURES FOR EXPLORATION AND DEVELOPMENT ACTIVITIES HAVE ALREADY BEEN SHARPLY CURTAILED, AND ALL EXPECTATIONS ARE THAT THEY MAY BE CURTAILED EVEN FURTHER. MOREOVER, THE LONGER THAT PRICES

STAY LOW, THE MORE DOMESTIC PRODUCTION WILL DECLINE AND WORLDWIDE CONSUMPTION WILL INCREASE. NORMAL ECONOMIC GROWTH INEVITABLY MEANS THAT GROWING DEMAND WILL OVERTAKE EXCESS OIL SUPPLY, WHICH I BELIEVE WILL OCCUR BY 1995. ONCE IT DOES, EVEN RELATIVELY MINOR DISRUPTIONS IN OIL SUPPLIES CAN BE TRANSLATED INTO MAJOR PRICE INCREASES WHICH HAVE SIGNIFICANT ECONOMIC CONSEQUENCES. THIS WILL ENABLE EACH OIL EXPORTING COUNTRY TO EXERT ENORMOUS LEVERAGE WITH CONSUMING NATIONS, AND THEY WILL USE THAT LEVERAGE. COLLECTIVE ACTION WILL THEN NOT BE REQUIRED FOR THEM TO TAKE ADVANTAGE OF THEIR MARKET POWER. THAT HAS BEEN OUR EXPERIENCE TO DATE.

SOME SAY THAT THE RECENT FIRMING IN THE OIL MARKET IS GOOD NEWS FOR DOMESTIC PRODUCERS, BUT I AM NOT CONVINCED. WHAT HAS OCCURED IS BUT FURTHER PROOF THAT OPEC CONTINUES TO CONTROL THE OIL MARKET AND CONTINUES TO BE WILLING TO USE THAT CONTROL FOR ITS OWN ENDS. IF PRODUCTION QUOTAS ARE EXCEEDED BY TOO MUCH, I FEAR THAT SOME OPEC MEMBERS WILL AGAIN SIMPLY INCREASE THEIR PRODUCTION AND REDUCE PRICES IN ORDER TO DISCIPLINE OTHER OPEC MEMBERS. I AM NOT HAPPY LEAVING IN THE HANDS OF OPEC PRODUCERS THE POWER TO MANIPULATE THE OIL MARKET-- THEY HAVE THEIR INTERESTS AT HEART, NOT OURS.

OUR EMERGENCY STOCKS IN THE STRATEGIC PETROLEUM RESERVE ARE INTENDED AS A SHORT-TERM SUBSTITUTE IN THE EVENT OF A DISRUPTION OF INTERNATIONAL OIL SUPPLIES -- NOT AS A REPLACEMENT. AS OUR DEPENDENCE INCREASES SO MUST THE RESERVE GROW SO AS TO MAINTAIN 90 DAYS OF PROTECTION. THIS NEED IS FULLY RECOGNIZED BY OUR INTERNATIONAL TRADING PARTNERS IN THE INTERNATIONAL ENERGY AGENCY, AS WELL AS ELSEWHERE. WITH OUR SUPPORT, SEVERAL COUNTRIES ARE BUILDING STOCKS -- JAPAN, GERMANY, NORWAY AND FRANCE -- TO NAME A FEW. BUT THAT IS NOT

ENOUGH. WE MUST CONTINUE TO INSIST THAT OTHER COUNTRIES FULLY COMPLY WITH THE SPIRIT OF THE INTERNATIONAL ENERGY AGREEMENT REGARDING STRATEGIC STOCKS.

THE CONGRESSIONAL CONCERN ABOUT DETERIORATION OF OUR OIL IMPORT SITUATION WAS MOST RECENTLY EXPRESSED IN THE OMNIBUS BUDGET RECONCILIATION ACT OF 1986 WHICH REQUIRES THE SECRETARY OF ENERGY TO CONDUCT AN ENERGY SECURITY STUDY, AND FOR THE PRESIDENT TO SUBSEQUENTLY REPORT TO THE CONGRESS HIS VIEWS CONCERNING THE LEVELS AT WHICH IMPORTS OF OIL THREATEN THE NATIONAL SECURITY AND WHAT ACTIONS NEED TO BE TAKEN TO LESSEN THAT THREAT. I LOOK FORWARD TO RECEIVING THE DEPARTMENT'S REPORT AND THE PRESIDENT'S RECOMMENDATIONS, WHICH THE DEPARTMENT OF ENERGY IS REQUIRED TO DELIVER TO CONGRESS NEXT MONTH, FOLLOWED BY THE PRESIDENT'S RECOMMENDATIONS. AT THAT TIME, I WOULD HOPE THAT WE CAN HAVE APPEAR BEFORE THE COMMITTEE REPRESENTATIVES FROM ALL OF THE EXECUTIVE BRANCH AGENCIES WHO PARTICIPATED IN THAT STUDY.

GENTLEMEN, WHILE I LOOK FORWARD TO HEARING FROM YOU TODAY, LET ME BE FRANK. WE KNOW THAT THERE IS A NATIONAL SECURITY THREAT POSED BY OUR INCREASING OIL DEPENDENCE. WE KNOW FROM HISTORY THAT THERE WILL BE TROUBLE AT SOME TIME IN THE NOT TOO DISTANT FUTURE, AND PERHAPS AS SOON AS THIS AFTERNOON IF THE IRAQ-IRAN WAR TAKES A TURN FOR THE WORSE. WE KNOW THE DIMENSIONS OF THE PROBLEM, WE HAVE HEARD ABOUT IT FOR YEARS NOW. BUT WHAT WE NEED IS GUIDANCE AS TO HOW AND IN WHAT RESPECTS WE CAN DEVELOP AN ENERGY POLICY WHICH BLUEPRINTS THOSE ACTIONS THAT NEED TO BE TAKEN IN BOTH THE SHORT AND LONG-TERM TO REDUCE OUR ENERGY VULNERABILITY. WE HAVE SEEN THAT IT IS DIFFICULT TO ACHIEVE THE CONSENSUS NECESSARY TO ESTABLISH AND HOLD ONTO AN ENERGY POLICY THROUGH THE UPS AND DOWNS OF THE MARKETPLACE. FOR EXAMPLE, IN

1980 WE ESTABLISHED THE SYNTHETIC FUELS CORPORATION. JUST A FEW YEARS LATER WE ELIMINATED IT.

I LOOK FORWARD TO RECEIVING SUCH GUIDANCE FROM OUR WITNESSES THIS MORNING AS TO SPECIFIC ACTIONS THAT WE SHOULD TAKE AS WELL AS HOW TO ACHIEVE THE NECESSARY CONSENSUS IN ORDER TO IMPLEMENT AND SUSTAIN THOSE POLICIES.

The CHAIRMAN. Secretary Schlesinger.

STATEMENT OF HON. JAMES R. SCHLESINGER, GEORGETOWN CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Dr. SCHLESINGER. Thank you, Mr. Chairman.

It is difficult to address this subject this morning because in the introductory statements of the Chairman and the other Senators I think you have encapsulated the problem, but I shall go on and perhaps reiterate some of the points that you have already made.

Mr. Chairman, members of the Committee, it is a special honor for me today to be the initial witness before this Committee as it inaugurates its work in this 100th Congress by holding oversight hearings on the world oil outlook.

The past 15 months have been a period of enormous flux in the world oil markets, but two essential conditions stand out. The first is the rapidly rising American oil dependency, a reflection of the volatility at the lower level of oil prices.

The second is the ineluctable growth of that oil dependency on the world's premier oil region—the politically tempestuous Middle East.

I see no reason, Mr. Chairman, simply to repeat my comments of ten months ago in the Committee's oversight hearings of March 14, 1986. I will provide that earlier statement for the record. Let me, however, reiterate these three points from those earlier observations.

First, we are today sowing the seeds of the next energy crisis, a point that you have just made, Mr. Chairman.

Second, what may be called the normalization of OPEC proceeds apace, with all——

The CHAIRMAN. Secretary Schlesinger, would you pull your mike a little closer? The radio cannot pick it up. That is better.

Dr. SCHLESINGER. Second, what may be called the normalization of OPEC as a cartel proceeds apace with all that that implies for continuing price volatility and the uncertainty of outlook for domestic producers.

Third, energy represents not a unitary problem but a congeries of problems. The same falling oil price that provides consumer benefits and provides a macroeconomic stimulus while easing inflation and interest rates also implies serious problems for domestic oil supply and for the national security.

I believe these points have been amply reinforced by the events of the intervening months. Today I should like to add the following observations.

First, the devastation of the domestic oil industry has occurred even more rapidly than was anticipated a year ago. Production has fallen at an annualized rate of more than 800,000 barrels a day. In the years immediately ahead, further production declines of 400,000 barrels a day or so appear likely. This may accelerate at the end of the decade as we hit the decline curve at Prudhoe Bay.

Second, a nation will have an energy policy whether or not it consciously addresses itself to its formulation. Today the United States has a de facto energy policy which we can call "Growing Energy Dependence." Next year we shall go over 40 percent dependency on foreign suppliers of fuel liquids for the first time since 1979. By around 1990, according to current trends, we shall be importing nine million barrels a day, and have reached for the first time in our history the 50 percent dependency level. In the middle 1990s we shall require as much as 13 million barrels a day of imports, if it is available.

Third, the domestic oil industry has come in the years since 1973 to venerate market forces, but the oil industry has been the classic example in which restraint on the full force of competition has been unavoidable. Particularly is this so in this era for the domestic oil industry. Market forces operate by squeezing out the high-cost producer, the marginal producer. That sounds splendid in the abstraction of supply/demand models, until we realize that the marginal producer to be squeezed out by these anonmyous market forces is us: the United States. If we believe that we must maintain for national security purposes an adequate domestic oil production capacity, we should not allow that capacity to depend upon the adventiteous outcome of OPEC bargaining.

Four, the administration has been content to allow laissez-faire to prevail. As the domestic industry itself has turned back toward its pre-1973 apprehensions about being the mere plaything of an international market dominated by far lower cost producers, the administration has declined to interfere with the free play of market forces. The consequence will be a rise in America's energy vulnerability—far more rapid than required by our resource base.

Five, by the early 1990s we shall see a world oil market dominated by an "inner cartel," fewer in number than the present OPEC consisting of the principal Persian Gulf producers. Were Iran to crush Iraq in the ongoing conflict, that inner cartel itself might be primarily dominated by Iran. The prestige and the power of Iran has been rising of late. We have recently had revealed the willingness of the United States itself, contrary to our professions, to propitiate the Iranian regime. Indeed, that has been reiterated in the headlines in this morning's paper, that negotiations continued with the Iranians according to an Iranian agenda, even after the President had indicated that those negotiations were to end. That is a reflection of the rising prestige of Iran. Where America leads, Mr. Chairman, others are likely to follow. Saudi Arabia too has in recent months acted to reach an accommodation with Iran—despite the implication for its sister Arab state, Iraq, which is engaged in a mortal struggle with Iran.

Six, quite simply American oil dependency means lessened leeway in foreign policy. As the leading Western power, the United States cannot afford to have its freedom of action too constrained. Let me cite, Mr. Chairman, one simple example. Some nine months ago President Reagan decided to punish Colonel Quaddafi for his many terrorist actions and provocations by air strikes against Tripoli and Benghazi. It is not my purpose now to weigh the merits of his decision, but rather to pose this question: How easy would it be for some future President to strike at an Arab oil producer under conditions in which the international oil market is tight and the United States were dependent on imported oil for more than 50 percent of its supply? To pose the question is in a sense to answer it. The United States will, under those circumstances, have its freedom of action seriously circumscribed. That, Mr. Chairman, is the real meaning of energy constraints on American foreign policy.

We are now witnessing a curious race between the restoration of OPEC's power over oil pricing and the erosion of America's oil production capacity. That is for us an entirely unsatisfactory situation.

Some months ago, Mr. Chairman, I spoke with a senior OPEC minister friendly to the United States. He expressed a deep concern about the impact of a decline in the U.S. oil industry, particularly the oil service industry, on what he described as the American interest. Considerable damage had already been done, he suggested, but we Americans should stop it there. "You will be forced to rely on the Persian Gulf," he stated, "which is a part of the world that I can assure you that you do not want you to allow yourselves to rely upon." He closed by saying: "Someday"—presumably in the 1990s—"your people will look back and curse the officials who allowed this to happen."

Mr. Chairman, the question of energy supply is sufficiently important to the national security and to international stability that we should rely on something more than the Biblical injunction: "Take no heed for the morrow; for the morrow will take care of itself."

Thank you, Mr. Chairman. I am sorry to suggest that our energy policy is based upon "sufficient to the day is the evil thereof," but I trust that this Committee will help to ameliorate that problem. I am prepared for your questions, sir.

[The prepared statement of Dr. Schlesinger from March 14, 1986, follows:]

EMBARGOED UNTIL:
10:00 am
March 14, 1986

STATEMENT OF
JAMES R. SCHLESINGER
BEFORE THE
UNITED STATES SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
OVERSIGHT HEARINGS ON
"THE DOMESTIC AND INTERNATIONAL PETROLEUM SITUATION"
March 14, 1986

Mr. Chairman, Members of the Committee

It is for me a special pleasure to appear before this Committee today to examine the consequences of rapidly changing oil prices. For me this session provides a touch of nostalgia — a remembrance of things past. In previous years I testified before this Committee on precisely the same subject. On those other occasions, however, oil price movements were causing problems by moving upwards rather than downwards — as at the present time.

The current decline, in a sense, implies a reversal of the macroeconomic difficulties encountered during the upsurge of oil prices in the 1970's — stunted economic growth, unemployment, and a general rise in prices. The impact of falling energy prices is to ease inflation and to stimulate more rapid economic growth. Serious long-term problems that were then alleviated by the rise in oil prices — long-term oil supply, and national security concerns — are now being intensified. Yet, since these are longer-term problems, they get relatively less attention. Indeed, in today's widespread euphoria regarding the macroeconomic benefits of falling oil prices, most notable in the financial markets, these issues are regularly ignored.

In recent years the excess capacity for oil production worldwide and the absence of steadily rising prices has led many Americans to a happy, if inaccurate conclusion: the energy problem is over. But the energy problem has not been solved; rather it is misunderstood. In fact, the energy problem is not a single problem, but rather a congeries of problems. It features the three interlocking elements of a.) the relationship of energy market performance to b.) economic growth and price stability and c.) security of energy supply and other national security concerns. The disquieting reality is that these elements operate at cross-purposes in terms of achieving national objectives. A rising oil price brings a serious deterioration in macroeconomic performance, but eases concerns about oil supply and national security. By contrast, falling energy prices bring rapid improvement for the overall economy, but a worsening of oil supply and national concerns, especially over the longer run.

In recent years the interpretation of the nature of the OPEC cartel has substantially changed. In earlier years it had appeared to many, including myself, that the burgeoning demand for oil that had marked the period since World War II and the limited resource base implied that the cartel was partially exempt from the ailments that have historically afflicted other cartels. But in the '80s these conditions have been altered. A small decline in oil usage of about 10 percent along with a modest, if temporary, expansion of non-OPEC production has subjected the cartel in the 1980's to pressures that the members scarcely anticipated in the '70s. Their expectation of steadily rising prices and expanding revenues failed to materialize -- and (at least temporarily) has turned to ashes.

What we see today may be described as "the normalization of OPEC" -- an OPEC becoming more and more like an ordinary cartel. We observe "price wars" intended to intimidate uncooperative producers into controlling production. We have seen the cartel leader, Saudi Arabia, watch its market share erode, as it attempted to hold up a price umbrella by serving as swing producer. Such market erosion is a phenomenon that has been experienced by leaders in other cartels in the past. The current price war was initiated by the cartel leader. But we should also bear in mind that Saudi Arabia is the low-cost producer. At $15/bbl. the Saudis still enjoy net cash flow of $13/bbl. or more. The same cannot be said in other production areas, where out-of-pocket costs may or may not be covered. For the United States, which is the highest cost oil province among major producing nations, the implications for its own long-term oil supply deserve long and careful pondering.

A second change in the character of energy markets is their immense volatility — in place of what was anticipated to be a steady rise in the real oil price. When energy prices fall sharply, volatility can provide significant benefits, so dramatically reflected at the present time in prospects for economic growth and in conditions in the financial markets. But volatility can also impose substantial strains, both economic and political. Both rapidly rising prices and rapidly falling prices impose pains of adjustment -- that economists tend to abstract from.

Let me turn now to a discussion of the three individual elements that combine to make up the energy problem.

I shall start with energy market performance. The recent fall in oil prices reflected a Saudi attempt to pressure the United Kingdom and Mrs. Thatcher into cooperation in controlling oil production. As Argentine generals had earlier discovered, the Iron Lady is not easy to intimidate. The consequence has been a drastic fall of oil prices which has, in real terms, brought them below the level prevailing in 1978 before the fall of the Shah.

When will the current chaos in the oil market come to an end -- and when will oil prices rise? Nobody knows! It is anybody's guess! All we have is speculation -- some, though certainly not all, informed speculation. In the United States the consequences of the drop in prices have been dramatic. Last week the number of rigs operating onshore had fallen to 1,248. That figure is 40 percent lower than last year -- and 75 percent below the peak reached in 1981. No one should expect a revival of drilling activity during this period of uncertainty. Not only is exploration and development activity being curtailed, but production is affected directly. Heavy oil production is now being shut in. With respect to well abandonments it is projected that we shall have some 30,000, if the price of oil remains at $15 for six months. Moreover, the substitution of other forms of energy for oil has now been sharply reduced, if not reversed. Conservation will be weakened. U. S. demand for oil will rise more rapidly than if prices had remained in the high $20's.

The upshot is that the United States is now in the process of creating a substantially increased oil dependency for the 1990's. By the middle 1990's we shall with high assurance reach the import level predicted by the Department of Energy of nine million barrels a day. In brief, we are now sowing the seeds of the next energy crisis.

Very briefly I shall comment on the economic and financial aspects of falling oil prices, for these are reasonably well understood. Worldwide falling oil prices are macroeconomically beneficial, since the number of consumers vastly exceed the number of producers. It should be noted, however, that this presupposes that the financial system will remain reasonably intact. (Economists tend to assume frictionless adjustments.) It also should be noted that the general economic benefits may not be paralleled by political benefits worldwide. I shall come back to this momentarily, for it broaches upon the subject of political and security concerns. We are keenly aware of the benefits of lower oil prices in the importing nations. But for many producers what we see today can be described as the Third Oil Shock. This clearly is the case in such countries as Mexico, Egypt, Nigeria, Venezuela, and even Saudi Arabia -- countries for whose political stability the United States has an abiding concern. Such countries have come to depend upon an inflow of revenue and have developed expectations with respect to living standards that will now collapse. It should be clear, therefore, that the fall in oil prices has detrimental elements associated with it, and is therefore not simply the beneficial reversal of the prior run up in oil prices.

I come, at last, to perhaps the most important long-term element and that is the national security impact of energy market conditions. The more rapid rise in energy imports, the more rapid decline in U.S. domestic production implies a degree of dependency of the United States on precarious sources of supply that inevitably causes concern. As the great international stabilizing power, the United States is in a unique position. Its dependence on insecure sources of energy would constrain its leeway in foreign policy — in ways of greater concern than would be true of the other industrial democracies.

But perhaps equally important from the national standpoint is the impact of falling oil prices on political stability in friendly countries. Egypt, for example, has been the principal U.S. ally in the Arab world. Last week there was a revolt among Egyptian security police recruits -- that required the Army to suppress. The Muburak regime is having increasingly severe domestic difficulties. Generally throughout the Middle East the effect of declining oil prices will tend to strengthen both radicals and fundamentalists at the expense of the Arab moderates.

The same concerns may be expressed about countries outside of the Middle East. Indonesia has been one of the happy developments in terms of U.S. foreign policy since the collapse of the Sukarno regime. As oil prices decline, the problems for Indonesia intensify: its development efforts wither, its ability to meet its current account obligations ends, and its internal politics may become more volatile. And, finally, there is the case of Mexico. Its problems indeed become increasingly severe, though one may hope not insolvable. The political condition of Mexico, one scarcely needs to observe, is of the deepest concern to the United States.

In conclusion, one may say that the consequences of a fall in oil prices are indeed mixed. However, on the negative side it implies a greater oil dependency in the long run and political instabilities in producing countries in the nearer term. Moreover, the very volatility that is now a characteristic of the oil market is in itself politically and economically disturbing. And, finally, if we need to be reminded of the delicate balance in oil market conditions, we need only look to the present circumstances in the Persian Gulf. If Iran and the Ayatollah Khomeini actually destroy the regime of Saddam Hussein in Iraq, then the oil market will be radically and permanently altered. Merely reflecting on that matter should cause us to examine the domestic consequences of falling oil prices.

Mr. Chairman, this concludes my statement. I shall be happy to answer any questions that you or the other members of the Committee may have.

The CHAIRMAN. Thank you very much, Mr. Secretary.

Ambassador Akins, with your indulgence we will go ahead and question Secretary Schlesinger first.

Gentlemen, let us try something new. Let us try the rule of self-restraint. I will not put a clock on anyone. Secretary Schlesinger is one we could question for a long time, each of us. Let us see if I can set an example—I am not sure that I can—in limiting my own questions, because I have so many.

Secretary Schlesinger, you have just told us that the free market, the invisible hand, is no answer to our energy, or our lack of, energy policy. What do you say to those who say let us drain the Middle East first, preserving American oil supplies for a day when we really need it?

Dr. SCHLESINGER. I would like to comment first on your observation. Mr. Chairman, we have always known that we have got to restrain production under various conditions. One was when demand receded. That was the basis of the creation of the Texas Railroad Commission's authority. It was followed by the Interstate Oil Compact. In more recent years, President Eisenhower under pressure from the domestic oil industry who did not want to expose the industry to the competition of cheap foreign oil adopted restraints on importation.

When President Nixon removed those restraints, industry was vastly disturbed. It was not until 1973 after oil prices shot up that the industry began to believe that the free market would work, and here after the collapse of prices the industry understands once again, as it did in 1957–58, that we cannot allow high cost American production to be undermined by what was then called, and is still, cheap foreign production.

To the question that you pose, Mr. Chairman, the answer I think is very simple. We need to sustain American production to some extent so that we do not become unduly dependent on foreign sources of supply, and therefore unduly vulnerable. Under the best of circumstances, we are going to be importing 30, 35 percent of our fuel liquids from abroad. That is probably sustainable.

When we go over 50 percent, we expose ourselves today in the here and now to those constraints on foreign policy. Mr. Chairman, it is true that if we continue to produce at this time heavily, that we will run out of oil sooner, but we cannot anticipate what the political conditions will be in the year 2110. We must live up to our responsibilities today, and the United States is the leading world power with major responsibilities for preserving international stability that no other power can accept.

The CHAIRMAN. Let me interrupt you right there, if I may, to ask you the ultimate question, the really big question. If in fact we are dismantling the American industry, and I think we are, and we do not have in place a policy that will keep the American domestic industry, then what do we do? What can we as policymakers do to preserve the American oil industry?

Dr. SCHLESINGER. Well, I think a prelude is an indication to the industry of the concern and the strong support of the Federal Government. That is a prerequisite.

Now as to specific policies, I think that there are two immediate elements that may be pursued. One is the arrangements that were established in the middle 1970s by the International Energy Agency, the minimum sales price, the MSP, in which it was contemplated that all of the importing nations, not just the United States, would establish a floor price for petroleum to preclude exactly what we see today. That is the elimination of marginal production, high cost production in the OECD countries.

Why a uniform pattern? Because otherwise our industry, if we pursue a higher price alone, will be subject to competitive disadvantages vis-a-vis the Germans and the Japanese.

The CHAIRMAN. A minimum sales price achieved by what mechanism?

Dr. SCHLESINGER. The mechanism was a variable one. It was never ironed out. It should be ironed out. But one of the proposals was indeed taxes or import fees in order to sustain that minimum sales price. I think that we should pursue that, rather than unilaterally going towards an import fee, particularly because it is politically acceptable to American industry if there is a uniform energy price.

As you probably know, Mr. Chairman, American industry will not be enamored of an import fee if American industry alone is forced to pay it. Well, industry people tell me they cannot drill until the price is up around $21, $22 a barrel and they have confidence it will stay there.

In effect, you are saying we need a price established high enough, whatever that figure is, so that they can have confidence and stability, or that that ought to be a worldwide set price?

Dr. SCHLESINGER. Amongst all the industrial powers.

The CHAIRMAN. And would you agree with me that probably there is no practical enforcement means other than a quota or a fee, or some variation on those themes, to achieve that purpose?

Dr. SCHLESINGER. That is correct, sir.

The CHAIRMAN. I have a number of other questions, but I will restrain myself and call on——

Dr. SCHLESINGER. May I add one other point please, Mr. Chairman?

The CHAIRMAN. Yes, please.

Dr. SCHLESINGER. The other area of obvious exploration is to use the Federal tax code as a way of stabilizing the industry so that depletion allowances, for example, would rise as the international oil price declined, and then decline if the oil price comes back up.

In this way, the tax codes can be used to preserve America's domestic production. I think that the industry would be prepared to see such action, if indeed it helped the industry to get through the hard times. Unfortunately, the Congress has just had tax reform which moved in the opposite direction to reduce the reliance on the tax code for social purposes.

The CHAIRMAN Thank you, Secretary Schlesinger.

Senator Evans.

Senator EVANS. Thank you, Mr. Chairman.

A number of years ago, I read a very interesting text on energy pricing and energy economics, and I vividly remember a simple little example which was used justifying, I suppose, the market forces in terms of energy. It dealt with the American, or the worldwide whale oil industry and the growing dependence of the world, and particularly the United States, on whale oil during the early 1800s as a fuel for lighting and other purposes.

As the whale population was depleted, our country had to search further for sufficient suppliers. As the marginal price of whale oil rose radically, there were statements made at the time that we were headed for extraordinary trouble, that the economy would be in a deep funk, and all of the same things we are saying now in relationship to oil.

Well, of course about that time discoveries were made in Pennsylvania of oil, and we shifted our patterns of consumption. We didn't follow, or pursue that path forever; we found an alternative, and we used that alternative to build an entirely new industrial society.

It seems to me that, at the very best, talk of minimum sales prices and import fees mean the artificial propping up of increasingly more difficult and higher cost production base. These are short-term, defensive fixes. I think they are ultimately losers, although we may have to use them temporarily.

Is not the focus that we ought to have as a nation and what we could do to help in the necessary research, probably intensified research, on a wide variety alternative fuels. We may find some successes, particularly alternatives not for central station plant energy production but for those kinds of energy sources that will fuel a moving economy, the cars and trucks and the rest of it. Coupled with that should be an intensified interest in greater efficiency with which we use our current oil supplies.

It seems to me that those two ultimately are the winners. A defensive program which may have to be used in the interim period in the long term ultimately is the loser. How far off base am I?

Dr. SCHLESINGER. I think you are right on the mark, Senator. You are talking about what was referred to some years ago with some fanfare, perhaps excessive fanfare, as a comprehensive energy program which incorporated shifting to other fuels other than oil, introduction of new alternatives, and preservation or strengthening of the domestic oil industry.

You are quite right that in the long run, and that is not too far away, we will run out of oil. The domestic base will dwindle. Therefore, what you refer to as palliatives indeed are palliatives to get us from here into the next century.

What we want, I think, is to pursue those alternatives both in terms of research and development and encouraging industry to shift to other fuels that are more readily available, such as coal, such as at least in the short run natural gas, and not to become dependent upon foreign supplies and, in addition, to pursue those new alternatives which we hope can be priced competitive.

I fear that we will never again have the boom represented by the discovery of mineral oil to replace whale oil in the 19th century. That was a cheaper and plentiful alternative. Opportunities like that come rarely. I do not want to say it will never occur again, but we cannot count on having so favorable a turn of events.

Senator EVANS. I would suggest that there is certainly one fuel readily available, if we could ever discover how to effectively separate it from its bonds, and that is hydrogen. It is readily available on a worldwide basis. It is a nonpolluting fuel. It has many of the aspects of an ideal fuel, except that so far we have not figured out how to economically separate it from the oxygen that it is bonded to so heavily.

Dr. SCHLESINGER. Absolutely right, Senator Evans. We should be pursuing hydrogen technology vigorously. It is not going to replace oil immediately. But even if we indulge in palliatives that you have referred to, that we are going to need supplements to our domestic fuel supply in the early 21st century, and we should have those alternatives as workable as we can have them.

Senator EVANS. Just one final thing, then. Do you have any specific advice for us as to directions we might move, or actions we might take that would aid in this dual process of seeking out the longer term alternatives and in doing what is necessary to maximize the efficiency with which we use our current fuels?

Dr. SCHLESINGER. I think that with respect to maximizing the efficiency, that the main point is of course to hold dependency on foreign and insecure sources of supply to some prudent level. I emphasize to a prudent level. We ought not to forego entirely more readily available oil abroad.

We can deal with that by a large petroleum reserve. But let me say, when we reach 12 million barrels a day of imports, that Strategic Petroleum Reserve that we have carefully created of only 750,000 barrels will last 60 days. It will be gone in 60 days at 12 million barrels a day of imports.

So we need to have greater efficiency in the use of our fuels with the constraint that we not become unduly dependent on foreign sources of supply. That means coal for utilities. It means more efficient use of natural gas, particularly by corporate America. And that will probably require policies of encouragement to industry that deviate from laissez-faire.

Senator EVANS. What would you suggest about fuel efficiency standards on automobiles?

Dr. SCHLESINGER. Senator, I applaud what you and Senator Johnston have done with respect to the question of the efficiency of applicances. I do not think that we should abandon at this time fuel efficiency standards for automobiles. We will be back in exactly the same soup in the 1990s. Not only are we watching our resource base deteriorate, we are allowing consumption to shoot up almost indifferently.

Now on the question of the alternatives, it is not only a question of what we sometimes regard as distant possibilities like hydrogen, it is the near-term alternatives. We have been watching in this country near-term alternatives like nuclear power simply become moribund.

Why? Because of the regulatory problems, the public relations problem; we have two plants in the Northeast that can replace hundreds of thousands of barrels of imported oil a day, and yet they are held up by regulatory problems. That would seem to me to be a subject in which the Senate, if not this Committee, should take some interest.

Senator EVANS. Thank you, Mr. Chairman.

The CHAIRMAN Thank you, Senator Evans.

Senator NICKLES.

STATEMENT OF HON. DON NICKLES, A U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator NICKLES. Thank you, Mr. Chairman.

Dr. Schlesinger, and Ambassador Akins, we welcome you again before this Committee.

Mr. Chairman, I appreciate your having this hearing. Glancing over at your statement, many of the comments which I have are somewhat identical to yours. With your permission, I will submit a statement for the record.

The CHAIRMAN. Without objection.

[The prepared statement of Senator Nickles follows:]

HEARING BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES

JANUARY 22, 1987

STATEMENT OF SENATOR DON NICKLES

Mr. Chairman:

I thank the distinguished Chairman of the Committee for scheduling the world oil outlook as the subject of the first oversight hearing of this committee. I am sure that the Chairman and many other of my colleagues here in the committee understand the economic hardship that has befallen the U.S. energy producing community as a result of foreign government manipulation of the oil market. During 1986, the average price of OPEC oil dropped from $27.81 to $16.10, and world crude sales averaged as low as $9.25 in August (data from EIA). Domestic producers, of course, watched helplessly as the prices for their oil also dropped from an average price of $25.64 on January 1, 1986 to single digit prices during the mid-year, and ended up at only $15.32 the first of this month.

We are all aware of the bank failures, company closings, and human suffering that have become commonplace in the energy producing areas of our country during the past year. This economic and social hardship is real, even though it may affect a relatively small number of states. However, it would be tragic if we did not recognize that the same cause of these regional woes also holds the potential for future economic suffering for the entire Nation. As foreign governments conspire to manipulate the price of oil, so must we acknowledge that the United States has not only not outgrown its oil import vulnerability, it is rapidly becoming more vulnerable with each passing month.

With the lower international oil prices has come lower domestic oil prices for U.S. oil--the world's high cost production. Domestic production decreased during 1986 by 7.7 percent, (from 9.030 mm bb/dy in Dec. 1985 to 8.335 during Dec. 1986, according to API), a loss of almost 700,000 barrels per day of production.

Our imports, of course, increased dramatically during 1986. EIA data indicate that our daily petroleum imports during 1986 averaged 21 percent more than the daily rate during 1985. (4.949 mm bbl/dy in 1985 v. 6.012 in 1986; numbers exclude SPR purchases).

We are now approaching a forty percent dependency on foreign oil. API reports that during the month of December, the U.S. imported 39 % of its domestic oil needs (not counting SPR imports). And imports for the first three weeks of January are averaging even higher rates (6.665 mm bbl/dy for the two weeks ending 1/16.) As most Senators here are aware, our Nation's 33 percent dependency on foreign oil in 1973 was sufficient to precipitate the first OPEC-triggered oil shock to our economy.

I am deeply concerned that the U.S. petroleum industry will be unable to meet the future energy needs of our Nation. Low energy prices have caused massive cutbacks in exploration and development by oil and gas producers of all sizes. There are less than half the rotary rigs operating in the U.S. than there were one year ago. This reduced exploration will dramatically affect the ability of the oil industry to resist the natural decline in U.S. production capacity.

I intend to remain very active again this year in my efforts to decrease our Nation's energy dependence. I have already introduced two measures designed to improve private incentives to find and produce oil in this country. One is S. 200, a repeal of the Windfall Profit Tax, which has been cosponsored by my committee colleagues, Senator Domenici, Senator Bumpers, Senator Wallop, Senator Murkowski and Senator Hecht. The other is S. 276, a measure to impose a $20.00 floor on oil imports.

In addition, I am concerned about the exacerbating effect that low world oil prices have had on the natural gas industry in this country. I am planning to reintroduce my 1985 bill on gas pricing and Fuel Use Act repeal, S. 1302. In addition, I have been pleased to cosponsor the distinguished Committee Chairman's bill, S. 85, which calls for the repeal of the fuel use restrictions of the Fuel Use Act and elimination of Incremental Pricing. I look forward to prompt Committee action to eliminate the Fuel Use Act's proscriptions on marketplace ordering of fuel choice by major fuel users, including utilities.

I also will be watching with great interest the outcome of recent FERC announcements regarding its intention to find solutions to the serious "take or pay" problems facing producers and pipelines in our troubled gas industry, as well as the outcomes of the litigation of FERC Orders 436 and 451.

Mr. Chairman, I look forward to working with you and the other distinguished members of this committee during the 100th Congress.

Senator NICKLES. I noted in your statement, and in my statement as well we do talk about the fact of our vulnerability—and I say "fact"—I think as evidenced by the closed hearing that we had the other day. A lot of times people, and even officials in the government, are not aware of how vulnerable this industry and the American public have become just in the last 12 months.

Our imports just between 1985 and 1986 have risen 21 percent, and risen even more the last month. That was comparing December to December when we looked at about 5 million barrels a day to 6 million barrels per day. Already in January we are at 6.6 million barrels per day.

Mr. Chairman, I hope, too, that people realize that energy prices at some point are going to be increasing, and what that negative balance of trade is going to be hitting; because we have been looking at importing oil last year in the $14 range, from as low as $9 to as high as $18. If we go back up to the $28 range, you are going to be looking at an astronomical figure flowing overseas, greatly exacerbating an already horrendous negative balance of trade.

We were looking at paying oil prices for imports, if I remember, of about $55 billion. That figure could easily be $75 billion as the level of imports increase and the price of oil rebounds, which I think as our dependency on foreign sources increases is quite likely to happen.

I am very sincere about welcoming our two panelists and I am pleased that you made it in today with the weather. If you go back about 15 months ago it is 27 percent; today it is 39 percent.

Dr. Schlesinger, in your statement you mention that this year we will pass through 40 percent. I would predict that you are on target. I think we will be well past the 40 percent this year. My guess is we will be up into the 43 percent probably by the end of the year. If I recall, in your statement you said by 1990 we will be in the 50 percent range.

Chairman McClure might remember when we had the Secretary of Energy before this Committee and I was raising similar concerns. a year ago I said, if you remember, that within five years we will be through that 50 percent threshold, and I think more people are now coming to that conclusion. I am not sure it will take us until 1990. My guess is we will probably be in 1989 when that happens. I think it will happen, and I think the American people should be aware of that and also the dangers that are encumbent with it.

I appreciate the statements that were made, Dr. Schlesinger. You made two or three comments that I would ask about. One, you mentioned variable depletion last time. I think that is an excellent suggestion, as some of us do have it in proposed legislation although the possibility of being enacted is difficult.

You mentioned this minimum sales price by a group of nations——

Dr. SCHLESINGER. The International Energy Agency. They have agreed.

Senator NICKLES. I am not sure they have agreed. I do not know that we could get our allies to agree to anything like that.

Dr. SCHLESINGER. Sir, it was agreed in the middle 1970s. It was spelled out. Because of the subsequent developments it was put on the shelf. But it is only a year ago that the Germans, the Germans, an importing nation came to the IEA and inquired whether it was not time to look at the minimum sales price, and we Americans shook them off.

The CHAIRMAN. I think it was a $7 price.

Dr. SCHLESINGER. Well, it would have to be much higher than at the time the price was $7, but I think that the price was $7 or $8 in 1975, but we are looking now at the equivalent of an $18 price, somewhere in that range, as today's equivalent of that MFP.

We shook them off a year ago. Now the Germans are importers, but they remember the middle 1970s when the United States came surging into the international oil market, and from their point upset the balance in that market, and they want to avoid a repetition of that in the 1990s, and they are prepared to pay a higher price today, I believe.

Certainly we should not rebuff such interest on the part of other nations.

Senator NICKLES. Let me rephrase it. Do you think there is any possibility in the world that our allies, and particularly looking at Japan and other major importing countries such as Germany or France or Japan, would ever conceivably go with anything along the idea of an $18 or $20 minimum sales price?

Dr. SCHLESINGER. In principle, they have accepted it. There may be some dickering about the price, but the only way to find out what the response will be is to pursue it through the IEA. That is, doing this on a multilateral basis is preferable to doing it on a unilateral basis. That is my only point.

Senator NICKLES. I understand that point as far as the competition, but I do not see it. I see if we tried to say, well, we will do it if we can get everybody else to do it, but it would never happen.

Dr. SCHLESINGER. I want to avoid having my views in that position. I think we should try it first. As I indicated to this Committee last March, I do not think there is a political base for the unilateral imposition of an import fee, but I myself am prepared to go in that direction. I think that there are preferable alternatives, but I think that we ought to be doing something to preserve our industry.

Senator NICKLES. I agree with you. One final comment.

You mentioned the import restraints, which I guess were in effect going back to what, the Eisenhower Administration?

Dr. SCHLESINGER. 1958. In the summer of 1957 there was the initial establishment. They were codified in 1958. They lasted until about 1970. In 1969 President Nixon established the Schultz Committee, which spun across the government. It was recommended that those constraints be removed.

Senator NICKLES. Did that limit imports to, what, so many million barrels per day, or what?

Dr. SCHLESINGER. Initially the limitation was to 12 percent of domestic consumption. That was gradually eased as our appetite for oil rose and we could not sustain it. But it rose to about the low 20s.

Senator NICKLES. How was it allocated between countries or companies which would be buying? I have seen a lot of problems where a lot of people have come to me and said, well, you cannot do an import fee; you do not have the votes. Let us do some type of quota system. And I have not seen anything that would work.

Dr. SCHLESINGER. I think that the best thing to do under those circumstances is to auction off the import rights. By the way, it might help alleviate your problems of dealing with the budget deficit.

Senator NICKLES. Mr. Chairman, thank you.

The CHAIRMAN. Thank you, Senator Nickles.

Senator Conrad.

Senator CONRAD. Thank you, Mr. Chairman.

Dr. Schlesinger, welcome. I come from a major energy State. Most people do not think of North Dakota that way, but we are the ninth largest oil producer and a major repository of coal. I have supported a variable tariff, and frankly it is not particularly popular politically at home because most of the population of my state is not in the energy area. But it strikes me that we are on dangerous ground and it is going to get more dangerous as we become more dependent.

I would be interested in how you answer the people who criticize any variable tariff, or any other move like that by saying, look, we ought to use the reserves of other countries before we use our own. We ought to keep our reserves through market forces.

What is your answer to people who make that argument?

Dr. SCHLESINGER. My answer to that is, it is a half truth. What we are attempting to do is to strike a balance between dependency and using fuel liquids more readily available abroad without becoming unduly vulnerable.

If we were to allow the unrestricted forces of competition to operate, we will be producing in this country a couple million barrels a day, and we will be importing 16 or 17 million barrels a day, and there is only one place, the tempestuous, the volatile Middle East.

We already see the indignities with which we have been willing to put up because of the fears about the future of the Middle East. One can readily imagine the degree to which the United States would find it necessary to defer to other powers, and I think that when you talk to your farmers and small towns people in North Dakota, ask them how much they would like to see the United States groveling before the Ayatollah.

Senator CONRAD. Dr. Schlesinger——

The CHAIRMAN. Not again.

Dr. SCHLESINGER. That would diminish some of the enthusiasm for imports.

Senator CONRAD. Some will feel we have already done that, at home.

Dr. SCHLESINGER. You ain't seen nothing yet, Senator.

Senator CONRAD. Let me pursue that a bit more, if I might, Mr. Chairman, because I was interested in your statement on the relationship of Iran to the other countries in that area. The analysis in your paper is that if Iran were to defeat Iraq, which might well happen, Iran who has a history of being a price hawk might then exert rather extraordinary influence over Kuwait and over the Saudis.

What is your analysis of the effect on the world price and OPEC's role in setting the world price if Iran were successful in this war?

Dr. SCHLESINGER. I think that we can look to prices. Senator Nickles mentioned prices that we have faced in the future, those constant dollars that the Senator was using. We are looking at prices in the $40, $45, $50 range. Incidentally, with the level of imports that we contemplate, that would be $120 billion of out-payments in the balance of payments, more than $75 billion.

But I think that the Iranians would be hawks, and imprudently hawks, and that they would drive up the price higher than was in their longer term interest. But under those conditions, unless there were protection offered to the Gulf Arabs, and I must say that the confidence of the Gulf Arabs in protection offered by the United States is less today than it was 60 days ago.

Unless protection were offered to the Gulf Arabs, they would be dominated by Iran. They would be forced to defer to Tehran on all of these issues. Production orders I think would come out of Tehran, and they would be fearful of the certainty or the uncertainty involving the survival of the regimes in those countries.

Senator CONRAD. So the threat to this country's energy security if Iran wins the war is very serious.

Dr. SCHLESINGER. I think so.

Senator CONRAD. That would be your conclusion.

Dr. SCHLESINGER. I think so. I think that we want Iraq to survive. We do not want this revolutionary power. Iran is the first revolutionary power that we have seen since communist China in 1949, and if it came to dominate the oil tap, we would find that quite embarrassing. We do not want Iran to win, and we should be very clear in our own minds that that is what we want.

Senator CONRAD. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Conrad.

Senator McClure.

Senator MCCLURE. Thank you, very much.

Mr. Chairman, I am sorry to have been late getting here this morning, because I have been waiting with a great deal of anticipation to hear these witnesses this morning.

I was detained. The Select Committee is announcing this morning the selection of Chief Counsel for the Select Committee, a matter of some importance and some urgency in getting that underway. So I was there for that reason.

I am pleased to have heard your answers to the questions that have been asked, and I do not mean to repeat any of those questions, but we are less vunerable today than we were before for two major reasons. One is that we do have a Strategic Petroleum Reserve that at least has the opportunity to moderate short-term supply gaps, and therefore the excessive responses that sometimes occur from an apparent or a real shortage.

The second is that world consumption has dropped, and therefore the gap between supply and demand is greater than it was. But absent those, are we any better off today than we were in 1979, or in 1973? Are there measurable differences to the vulnerability?

Dr. SCHLESINGER. We are only slightly better off than we were in 1979, and somewhat worse off than we were in 1973 just in terms of the percentage of oil dependency. We are also better off in that I think that the American public is more alerted to this problem and better able to respond.

Senator McClure. I know that you have made reference both in your statements that have been filed and in response to questions with respect to the growing vulnerability if current trends continue. But even if we were to assume that the trends would be reversed, how long does it take us to redress the imbalance that you see?

Dr. Schlesinger. I think that we are going to have to be prepared to live with 40 percent imported oil for some time. The greatest problem that we have has been not the devastation of production and reserves, those decline slowly, it is the devastation of the oil service industry. And that will have to be recreated, or revivified. We are going to have to bring back, or attempt to bring back those geologists who have now left major companies. When you see these retirement programs just in terms of manpower, the people who take early retirement are the very people you do not want to leave.

So we are weakening our oil service industry, and that is I think the long pole in the tent, and it will take us some years to recuperate.

Senator McClure. There is a big debate over Outer Continental Shelf exploration. Do you regard exploration of the Outer Continental Shelf of the United States as essential to our Nation?

Dr. Schlesinger. Absolutely.

Senator McClure. If we are capable of putting together an OCS drilling and exploration program that has both technological feasibility and enough political support to make it possible, how long does it take for that to measurably affect finding rates, reserve capacity, or production capacity?

Dr. Schlesinger. It is going to be five years before it measurably affects finding rates, and probably 10 to 12 years before it begins to result in production. We have long lead times. That is one of the reasons that one runs high risks in depending upon unfettered market forces.

Senator McClure. One of the decisions facing this Congress is likely to be the political decisions with respect to the desirability or feasibility of exploration in the Arctic National Wildlife Refuge. The ANWR decision is a tough one.

Again assuming that the political decision can be made affirmatively and allow exploration in that area, how long would it take to determine whether or not there is a resource there, and if so, how long would it take to develop that resource?

Dr. Schlesinger. I think that before one begins to have an adequate sense that one has really begun to plum the area is probably four to five years minimum, and that it will begin contributing in a major way to our supplies in 10 to 15 years. It depends upon the degree of acceleration, but we go slow in this country. And that is a difficult task.

Senator McClure. As I recall your predictions, it is declining production, increased dependence upon imports, barring acceleration of events by others that we get unduly and dangerously increasingly dependent over the next few years, and that sometime by the 1990s, sometime in the 1990s there will be a crisis?

Dr. SCHLESINGER. I think that is very likely, Senator; almost certain.

Senator MCCLURE. Almost certain. And then you tell us that we are 4 to 15 years away from being able to do anything very much about it in the most promising areas that we have, which are OCS and ANWR. So that you project an overlap, if I understand you correctly, an overlap in time?

Dr. SCHLESINGER. Absolutely. We have now determined that the early 1990s at least, and maybe the later 1990s as well, will be periods of much greater vulnerability for the United States.

Senator MCCLURE. Do you share the conviction that many people do that the entitlements program that we had once before was nearly an unmitigated disaster?

Dr. SCHLESINGER. I had the pleasure of administering that, Senator.

Senator MCCLURE. That is why I asked you.

Dr. SCHLESINGER. So I would not—I cannot think of any words better to express it.

Senator MCCLURE. How do we avoid getting back into that if we start adopting import restrictions, or fees, or quotas, or allocations? Is there a better way to do it than was tried last time?

Dr. SCHLESINGER. You have put me in an embarrassing position, Senator, since the only thing that I can offer to you is firm political resolve.

Senator MCCLURE. You can offer that, but how do we obtain that. [Laughter]

Dr. SCHLESINGER. The problem will be that importers will be marginally disadvantaged relative to domestic producers. They will be in here visiting Members of the U.S. Senate and they will be seeking relief, and they may find it. As you will remember, the protection that was offered to small refineries came through one Joseph Califano, otherwise inclined to regard that as catering to the special interests, but when one is in private life one overlooks those kinds of things. [Laughter]

The CHAIRMAN. And endorsed by this Committee.

Senator MCCLURE. Yes. Well, I asked the question not to embarrass you at all. I think every one of us were equally embarrassed by the political pressure that did come. But as I recall, at that time we had price controls in this country, and higher prices on imported oil. We had service stations on one corner that were able to offer gasoline at 10 cents a gallon under a competitor on the opposite corner.

They understandably did not like that competitive disadvantage thrust upon them by the government, and they sought redress through the political channels that were available to them. I do not know how we avoid that the next time around, if there is one.

Dr. SCHLESINGER. If one has different prices for domestically produced oil, it is impossible to avoid that. If it is only the difference between—if there is no control price on domestic oil and there is an import fee on imported oil, then it is difficult but possible to avoid it, because domestic prices will be permitted to rise under those circumstances.

Senator McClure. If you can keep the two imperatives.

Dr. Schlesinger. Right. The distribution of benefits amongst importers and domestic producers will be affected, and consequently you will hear the complaints from those whose benefits are less.

Senator McClure. Well, I know that you have been around a number of years. You have lived through the ups and downs of this kind of issue. But I know that a lot of people have not been around as long as you, or as have I; but I would point back to a 1980 Energy Committee Staff Report titled "The Geopolitics of Oil." That staff report noted that at a Committee hearing Senator Bellmon asked a witness this question: "What chance do you feel there is to getting through the 1980s without a major disruption? Maybe a five million barrel per day reduction in oil production?"

And the witness responded, "Almost none."

You are suggesting much the same thing here this morning, that there is almost no chance of avoiding that at some predictable time in the future. The exact date, none of us knows. Is that correct?

Dr. Schlesinger. That is correct. The only way of avoiding that is through the political stabilization of the Middle East, and we have not developed a strategy for that, nor do I think we are prepared to put up the resources even if we had the strategy.

Senator McClure. Dr. Schlesinger, you closed your statement this morning with a Biblical quotation which would indicate that you are something of a Biblical scholar, or at least you read it. That goes back several thousands of years. Has there been political stability there in your reading of the Bible during any very extensive period?

Dr. Schlesinger. Until this point, the great United States of America has not taken an interest in bringing stability to the area; consequently, there has been little. Perhaps that will continue in the future.

Senator McClure. Do you think we have the capacity to bring it about?

Dr. Schlesinger. I think that the United States can reduce—has a high probability of being able to reduce the level of instability, and that we are not going to stabilize the region.

Senator McClure. Thank you very much.

Dr. Schlesinger. It is not Western Europe.

Senator McClure. I have in the past expressed my appreciation for your testimony before this Committee and others, and I do so again this morning. Thank you very much.

Dr. Schlesinger. Thank you, Senator.

The Chairman. Thank you, Senator McClure.

Senator Murkowski.

Senator Murkowski. Thank you, Mr. Chairman.

Senator McClure, I could not help but stand up straight when you mentioned ANWR, and I would like to——

Senator McClure. Where is that?

Senator Murkowski. It is north of here. [Laughter.]

Slightly in the direction the snow is coming from this morning.

In view of the reality associated with the time frame that you have outlined for I think you said plumb time 4 to 5 years, and 10 to 15 years before a wilderness area could be brought in. Can you suggest to this Senator how we can focus in on the public's legitimate concern on the environmental impacts associated with ANWR, the concern with the caribou calving area, recognizing that about 20 percent of our domestic oil produced in the United States currently comes from Prudhoe Bay, and that there has been a continuation of calving of another caribou herd in that area?

We have a situation where we are seeing some of our colleagues over in the House already polarized on the issue. Commitments are being made on the basis of a legitimate environmental concern, without a realistic opportunity to observe what has taken place in the Arctic with regard to the caribou and other environmental concerns that I again want to cite are quite legitimate.

You have been in a position of addressing wilderness areas from the standpoint of exploration. I think you are well aware that in our State I think we have about 375 million acres. Nearly a third of that is off-limits to any exploration of any kind. It is basically wilderness, wildlife-sensitive areas.

What would you suggest we do to try and convey the significance of what you and others predict the reality is? We seem to respond to crises. When we had an energy crisis, why the people would come to this Committee and say, Why are you not doing something? Why did you not do something?

Can you elaborate a little bit for me on what you might suggest?

Dr. SCHLESINGER. Yes, Senator. I should point out that in 1979 I was firmly in favor of controlled exploration of the ANWR. That was not commercial exploitation at that time, but I felt that it was necessary for the United States to know then what it had in order to shorten the lead times to which you refer. And I think that, given the concern, that we can proceed with control. That is one area for you, both Houses of Congress, to explore: How one can have controlled exploration, either geographically—there are 26 major structures in the reserve, not all of them, in fact very few of them on the calving range of the caribou, and therefore one could develop a plan that would start the exploration in those areas that would not be environmentally sensitive, and the structures not visited by the caribou.

It would seem to me also that you I think recognize that their environmental alarms may be excessive, as well as environmental concerns legitimate. When we built—when we were watching from Washington as you were watching from Alaska the building of the oil pipeline, there was great concern expressed about the caribou. As I recall it, the caribou go near the line now in order to get the warmth in winter.

Senator MURKOWSKI. The grass grows earlier there, and they can stand on top of it and get out of the flies.

Dr. SCHLESINGER. It has been an environmental boon. Warmth is beneficial.

Senator MURKOWSKI. Yes.

Dr. SCHLESINGER. I think that a better understanding of the environmental advantages, and a reduction of the alarmism that we sometimes see in this area—I would be willing I think to have the United States Government provide either the capital directly, or some of the capital for the exploration of the reserves, if a program cannot be worked out in which part of the reserve cannot be explored and developed directly. And I would reserve for the future the part of the reserve in which the calving of the caribou takes place.

But I think that if you look at the details of the problems, that you can have a solution that provides for the protection of the herds without giving up the exploration and development at least of part of the reserve, and that that should be a solution that is satisfactory to anybody who is not a strict preservationist.

Senator MURKOWSKI. Recognizing that it has been estimated that the area could contain up to 30 billion barrels of oil, and the fact that you have already forecast substantial exposure to the United States from the standpoint of energy independence, can you predict for this Senator where you might be at a given time out there when this crunch would occur, if indeed there happens to be 30 billion barrel a day in there and we do not have it in 10 to 15 years?

Dr. SCHLESINGER. Well, I think that much depends upon the energy policies that the Congress and the President embrace. We can be more or less dependent on oil, and therefore more or less dependent on imported oil. But the way we are going now, we are heading for domestic production of about 4.5 or 5 million barrels a day towards the close of this century. And since we are not shifting for nontransportation purposes to other fuels, we are going to wind up dependent 75 percent on imported fuel liquids, and that is too great a burden to impose upon our foreign policy for the future.

We are heading for low oil production. We will slip below 8 million barrels this next year the way we are going. By the middle 1990s, we will be down to about 5.5 million barrels.

Senator MURKOWSKI. I just have one other question, Mr. Chairman. What effect, if any, does the substantial decline in the value of the U.S. dollar have on the current and future oil prices?

Dr. SCHLESINGER. The effect of the decline of the U.S. dollar will be to make oil in the long run relatively cheaper for European and Japanese importers, and relatively more expensive for American importers. Since it is not denoted at this time in a basket of currency, it is a little hard to describe. But the effect of the reduction of the dollar price under these circumstances will be to induce the residue of the cartel that we see today to attempt to raise the price more than if the dollar had not declined.

And since American pay prices in dollars, and Germans and Japanese pay in Deutch mark and yen, that will be a heavier burden on the American consumer.

Senator MURKOWSKI. From the standpoint of domestic priorities, in an order of priority where would you rate domestic exploration in unexplored areas?

Dr. SCHLESINGER. I would place it very—you mean individual areas to explore?

Senator MURKOWSKI. Just two or three. Would you rate ANWR at the top of the list?

Dr. SCHLESINGER. I think that ANWR is the greatest unexplored asset on the North American Continent under our control. It is plain that if we are going to have any more giant fields, super giant fields, then it has got to come from the frontier areas, and this is the premier prospect in the frontier areas.

I think that we can move ahead. We will have to move ahead prudently, but we can move ahead.

Senator MURKOWSKI. Thank you, Mr. Chairman.

The CHAIRMAN. I thank you.

Senator Wirth.

Senator WIRTH. Thank you very much, Mr. Chairman.

Mr. Secretary, we are pleased to have you back. I might note, Mr. Chairman, that during my time in the House, I sat on the Energy Committee for many years during those twelve years I sat at the right hand of Mr. Dingell, and learned a great deal from Mr. Dingell and Dr. Schlesinger—who were most often in agreement, and thank goodness they were. It was a little bit like the Superbowl when they were not in agreement. I am delighted to have you here. Thank you very much.

I find myself in very, very strong agreement with the points that you have made this morning.

I would like to touch very briefly on ANWR, and then go to the European Alliance, if I might. It seems to me that as we look at the potential on the Coastal Plain in Alaska that there is a danger that we will follow the same approach that we did in the mid-1970s until we learned better, and that was to try to just produce our way out of the crisis and the potential crisis. We found out under your stewardship, and that of others, that we had to really focus on a balanced program that would include non-petroleum products.

We looked at oil shale, and coal, and solar, and we decided to aggressively pursue conservation. It seems to me that politically, it is difficult to say we are going to go off and explore in a wildlife preserve, but at the same time we are doing that we are going to relax the fuel efficiency standards for automobiles, and we are going to get rid of any kind of appliance labeling, and we are going to continue our prolifigate use of energy at a low price—the price at the gas pump continues to go down.

Politically that just does not make sense to me, nor does it seem to me that that suggests that we learned anything from the last 12 years.

Dr. SCHLESINGER. Your remarks are eloquent. I cannot add to them. We have no single solution to our energy problems. We must explore many alternatives, and the cumulative effect of paliatives will be to make our energy problem not resolved, but tolerable. As you point out, we cannot take the attitude that we once took.

I recall when the discussion started in 1977, the issue of conservation was looked at as somehow un-American by some. That, happily, is behind us. There is universal agreement on the need for conservation. At that time, it was said that conversation is not the American way; production is the American way.

If you approach the loosening of the environmental constraints at the ANWR, you are going to fire up the environmental community, quite justifiably. You must pursue a balanced program, and clearly there will be no toleration for developing the additional North Slope Preserves to be wasted in the eyes of much of our population.

Senator WIRTH. When you say there is universal agreement that conservation is now an American phenomenon, I am not sure that that is shared at the other end of Pennsylvania Avenue at this particular point, but I think most people have come to recognize that it is good economics.

In any case, I would say to the——

Dr. SCHLESINGER. I think the rhetoric of the Administration that started quite hostile on the conservation question has become much more moderate. In the 1980 campaign, Candidate Reagan said that conservation means that we are hot in the summer and cold in the winter. Well, I have not heard that kind of comment from the President or any of his senior advisers for five, six years. So I think that there is some change, some improvement.

Senator WIRTH. The rhetoric may have cooled. But the actions, for example by the Department of Transportation in relaxing the automobile fuel efficiency standards, seems to me to be just a scandal in the face of everything we know that is going on in the Middle East, and all of the programs that you have outlined.

At any rate, I would say to the Senator from Alaska that as we work through this very important issue of what we do with ANWR, I think that we do have to remember that this has to be kept in the context of the whole variety of other things that we ought to be doing; that a balanced approach to all of these efforts is not only good policy, but it is the only politics that are going to get us through this course.

We learned that before. We have to understand that history and come back and just review that very quickly and go ahead from there.

Senator MURKOWSKI. If the Senator from Colorado will yield?

Senator WIRTH. I would be happy to yield.

Senator MURKOWSKI. I think the point that has to be made here is that we do not know whether there is 30 billion barrels of oil in ANWR. We only know that it is the most promising area. The question before this Congress is going to be whether to allow exploration, as opposed to production. And if we do not go ahead and acquire that knowledge, obviously the question of whether it is in our long-term energy interests or reserve is moot.

Senator WIRTH. I understand the——

Senator MURKOWSKI. So I think we have to define what our objective is, and if our objective is indeed to make a determination whether we have the reserves, then we can address the issue of how or if we want to bring it onstream.

Senator WIRTH. Well, I appreciate what the Senator is saying, and I would just say that we also happily have a history in the 1970s to learn from. It suggests that when we find out that there may be some potential there for development, then we tend to move in that direction and have only a development strategy to produce our way out of the potential crisis, and that tends to dominate our thinking. You tend to have interests surrounding that that are much more concerned about development than about conservation.

It is our responsibility, it seems to me, to keep that balance at the forefront. That is there all the time. I think, in any case—I know, Mr. Secretary, that you have a helicopter flight at 11:40.

Dr. SCHLESINGER. The helicopter is gone. It got snowed out.

Senator WIRTH. It's snowed out? Okay. I was going to say, lots of luck. I was hoping you were not going to get on that, because we want to keep your counsel around here for a long time on this issue.

Let me turn if I might, very quickly, to the European situation and the European perception of what we are doing. We talked the other day in the Armed Services Committee with you about the Soviet goal, premier goal, as I remember, of attempting to fragment the U.S.-European Alliance, and that was "a" if not "the" dominant political goal that they had.

The suggestion was also made that day, and other days, that perhaps our relationship with the Europeans was not as strong as it had been a year ago, or two years ago, given the questions coming out of the Iceland summit, and then given the questions raised about our resolve, coming out of the unfortunate situation in Iran.

Given the Soviet pressure to do what they can to fragment the alliance, and what has gone on in the last year-and-a-half, we come to an analysis of our relationships with the Europeans in terms of sharing energy.

We have, as I remember, the International Energy Administration—is that not right—IEA?

Dr. SCHLESINGER. Agency.

Senator WIRTH. And a number of compacts with the Europeans, that were to be invoked in a time of crisis, were there to be an embargo, were there to be a cutoff, that we would be sharing our energy reserves with the Europeans and the Japanese.

That always seemed to me to be a nice thing to say, but the reality of it is a little bit hard to come by; in time of real crisis the United States would be saying to people, well, you can only get five gallons of gasoline over here because we have to ship a good deal of our available petroleum reserves to the Germans or the Japanese? That sounds good if you say it fast enough, but if you stop and look at the situation it may not be the most realistic situation.

I wanted to ask you how you think we ought to deal with the Alliance, given that I agree with you about the inevitability of a crisis in the area of energy. Second, how do you believe the Europeans perceive us and our resolve in the energy area? What is their picture of what may be going on in 1991 or 1995?

Dr. SCHLESINGER. I believe, Senator, that we must work through the International Energy Agency, which is the creation of the United States Government. It was created after the 1973 crisis. Dr. Kissinger played a large role in its formulation, and it brings together those in the industrial world who have common interests.

I think that you are quite right that we cannot have unrestrained sharing, and that is not even contemplated under the IEA formulas. It is very limited sharing. It would not require the diversion of our own production to Europe. It would imply that whatever oil is available on the international market would go into higher proportions to Europe and Japan that have very little production of their own than to the United States. But it would represent a very limited diversion under those circumstances somewhat, but only slightly to alleviate the burdens of our allies.

I think that it is well advised for us to bear in mind continuously that the Soviet Union, if it comes to dominate or strongly influence the allocation of oil reserves around the world, would exploit an opportunity of that sort, to suggest to the Europeans that their oil problems would be much better alleviated if they would separate themselves from the United States and to give up the formulas represented by the IEA.

How do the Europeans look at us? It depends upon what we are doing—what we are doing in a year, in a decade. During the 1970s, the United States was viewed as the leader on energy problems. It was not always meticulously followed, but it was generally followed.

In this part of the 1980s, other countries are looking at the same data that we looked at this morning. They see American imports rising by 750,000 barrels a day a year, or perhaps even a million barrels a day a year. They can look out into the 1990s. Their view is shifting back from the United States as a helpful, thoughtful, statesmanlike leader to the United States as the great energy squanderer on the international scene.

And once we have begun to exhaust the excess capacity which is limited around the world, that European perception of the United States as the leading energy squanderer is going to grow. But it is already there.

Senator WIRTH. Mr. Secretary, thank you very much. We look forward to working with you.

Mr. Chairman, thank you, sir.

The CHAIRMAN. Thank you very much, Dr. Schlesinger. We are not disappointed. I know you have to go catch your airplane, whether via helicopter or however. We appreciate very much your testimony, and I hope we can have you back before we definitely solve this problem.

Dr. SCHLESINGER. I will confess, Mr. Chairman, that I will be riding Amtrak, which depends upon the continued mercies of the U.S. Congress.

The CHAIRMAN. Thank you very much. [Laughter.]

We have already introduced Dr. Akins, Ambassador Akins, who has been a distinguished Ambassador to Saudi Arabia. I know he will tell us what is going to happen to OPEC prices, and what we should do to prepare ourselves.

Dr. Akins.

STATEMENT OF DR. JAMES E. AKINS, AMBASSADOR OF THE UNITED STATES TO SAUDI ARABIA (RETIRED)

Dr. AKINS. Thank you very much.

If you thought you were going to get a broad spectrum of views in asking James Schlesinger and me at the same hearing, I am afraid you are wrong. I have very few disagreements with Dr. Schlesinger, or with any of the statements that you or the other Senators have made this morning.

The only point that Dr. Schlesinger made that I find some difficulty in accepting is his statement that the public is more alert today to the crisis than it has been, and therefore is more prepared for action today than it has been in the past. I am afraid that I have not found that to be true.

I testified last here on September 16, and I do not intend to review that testimony now, particularly since a lot of things have happened within the last four months. We did have an OPEC meeting. They did get their act together. They did work out sharing arrangements inside OPEC, and arrangements with the non-OPEC exporters, and prices have gone back up.

The question now of course is are they going to stick together or not? The economists in the country who told us for the last several years that OPEC was finished and the price of oil was going to go down permanently and the oil glut was a permanent phenomenon were somewhat confused by the OPEC agreement of December. So they now have not of course admitted error or adjusted their views, but are saying that the agreement will not last; that there will be cheating in OPEC in the spring; and prices will go back down again.

A panel of experts appeared on the Adam Smith program last weekend and all concluded that OPEC cannot last.

The CHAIRMAN. What program was it?

Dr. AKINS. The Adam Smith, "Money World."

That the price of oil for this coming year will average $15 for the year, but that it will swing say between $10 and $20 a barrel. This of course I think is not true, but the fact that this is believed by emminent economists certainly does not augur well for the domestic oil industry. That is the one thing that we cannot live with, of course, is the uncertainty. We are not going to put money into the ground if you do not know if you are going to get $10 or $20 a barrel for it.

In September I remember saying that I thought that the agreement would last, but there was a possibility that OPEC would have to go through another blood bath. I think that that is still a possibility, but in the interim I have talked to most of the oil ministers in OPEC and outside OPEC and there is a real determination to make this agreement stick.

A number of the governments have said that they cannot possibly stand another price war, another collapse of oil prices, and most of the countries that I have talked to are absolutely determined that this agreement will stick.

I think that it has probably a 75 percent chance of lasting. I know that even you, Mr. Chairman, do not seem to share that agreement, and it is certainly not shared widely.

King Fahad of Saudi Arabia has said that the price of oil should be brought back to $18 a barrel by the end of last year, and he just about achieved that. It is somewhat higher than that now. But he has also said that this is not to be considered the ceiling, but the floor price, and he hopes to get the price back to $25 a barrel by the end of this year, or by the end of next year at the very latest.

Others in OPEC are thinking of a somewhat higher price—that is, the restoration to $28. The Iranians and others are pushing for a much higher price, that is, $34 a barrel.

I think that if OPEC keeps its current production levels, and there is a good chance that that will happen, and the agreements that they have worked out with the non-OPEC exporters of oil hold, I think there is a good chance of that too, that means that we will have a shortage of oil in the world of about 3 million barrels a day on an annual basis. If that holds, the chances of their reaching their goals of $25 or $28 a barrel in a year or so are quite realistic. And I think, as I said earlier, that there is a very real chance that this will happen.

Now if that does happen, does that mean that the domestic oil industry is taken care of? Because we can quite clearly survive nicely at a price of $25 or $28 or certainly $34 a barrel. Unfortunately, it does not, because first of all there is scarcely a widespread agreement to my analysis, but even if it turns out to be true, there is going to be an uncertainty, a belief that, well, it will not last, they cannot stick together, there is going to be another price war, and we had better not put our money back into the oil industry.

I will come a bit later to some of the things I think should be done. I am sure you will be asking questions on that.

On September 16, just before I testified, the Under Secretary of the Department of Energy testified, you will recall, and he made some very interesting statements. That is, that by the early 1990s we will be importing around two-thirds of our consumption; and of that, most will be coming from the Persian Gulf.

These were startling statements, and I was at the time prepared to retract some of the unfriendly remarks that I had prepared about the Administration's realism in dealing with the oil policy. These were realistic figures. And then I sat back, as did you all, and waited for the Under Secretary to say what would be done to meet this problem, because quite clearly on the face of it it is a problem that is extremely, extremely dangerous for the United States.

And he talked about increased storage, which of course the Congress had forced on the Administration; and then he said, we will conduct a study—a study—on the security implications of importing most of our oil from the Persian Gulf. As far as I know, that study is not yet completed. I would have thought it would take about three seconds to write, because the consequences of such a development, their own figures by the way, are absolutely horrendous.

Then he concluded, basically, that the policy of the Administration was to allow the market—the market—to set the price of oil. The market will solve all of our problems.

This, I would like to emphasize once again, is a very, very sound, reasonable position provided that you can guarantee absolute political tranquility in the Persian Gulf. Now if you cannot do that, then there is something wrong with the policy. I thought the policy four months ago was very odd, to say the least, and I think it is positively weird today. [Laughter.]

I will return to the Iraq-Iran War, because it is of immense importance to what happens to our energy supplies, but right now I would like to repeat a few of the remarks I made then about the domestic energy industry, because I think they are even more urgent today than they were then.

When oil prices reached $35 a barrel in the world, the decline in the curve of American production leveled out. It would be very, very nice if that could happen again, but I am afraid that the American Congress, the American Administration, and the American public are not quite prepared for that. But I think that what we have to do is to make sure that the decline, the gentle decline in American production that we have projected for the last year must not be accelerated.

It is not very good. I was quite taken aback by Secretary Schlesinger's statement that we must be prepared for 40 percent imports for the foreseeable future. This figure I find absolutely hair-raising. He may be right. Maybe we do have to prepare ourselves for that, but it is certainly not a goal for the United States. 40 percent of our petroleum is to be imported? Most of that, we must remember, is going to be coming from the Persian Gulf.

I think that we have to talk quite specifically about some price in the United States. Oil import quotas I do not think are very feasible, but an oil import fee is. A variable oil import fee that would guarantee in the United States a domestic price of around $25, according to all the technicians I have talked to in the industry, would be sufficient to allow the industry to survive—not to prosper, but to survive.

I do not think that this variable fee would cost the American public very much in the long run in terms of paying out, because I think that OPEC—I am persuaded that OPEC will raise the price to $25 a barrel quite soon. But what the import fee would do would be to give the American producer the knowledge that if he went out, invested, found oil, that he could sell it for $25 a barrel. I would like a higher figure, but I think there is no point in talking about anything higher than that.

I also would like to point out here that we must not in this case do away with the windfall profits' tax. The windfall profits' tax is quite necessary to be retained in this case with the proviso that any income going to the industry because of the import fee that was not reinvested in the industry would be taxed away at savage rates. That is, I do not think it would be tolerable to the American public to have an import fee for oil, raise the price for the domestic consumer, and then allow an oil company to buy an insurance company or a department store.

There is not really much dissent in the country I think that a secure $25 price would result in renewed search and development of oil in the United States. I am not saying that this is a sacrosanct figure; maybe it should be a few dollars lower, perhaps it should be a few dollars higher; but it is a figure I think can be defended strongly and honestly.

We must stop talking about allowing the market to set the price of oil. There is not a free market in oil, and there basically has never been in this country. If there were a free market, and for awhile we appeared to be headed toward one, the price of oil would be a lot lower than it is today. It would certainly be under $10 a barrel, and the domestic industry would be completely destroyed.

The Department of Energy has also said that by the early 1990s supply and demand will be in balance. The figure that OPEC is using is that by 1992 supply and demand will roughly be equal. This is a frightening figure. 1992 is only five years away. That means that when supply and demand are in balance that any small perturbation in the oil supply, not only in the Middle East but any place in the world, would result in physical shortages, not political shortages, but physical shortages and the price of oil would skyrocket.

When we talk about preserving the domestic industry and we talk about the cost to the consumers, we must also look at the other side. What is the ultimate cost to the consumer going to be if there is a price war in the world? That is, there is a shortage, and people are bidding up, not bidding down the price of oil.

What happens if we are importing 10, 12 million barrels a day and the price of oil goes to $50 a barrel? Is there any way the United States is going to be able to pay for that? The balance of payments' problems that we have today would fade into insignificance in comparison with such a burden.

I must raise one other thing that I am sure will bore some of the older Senators on the Committee, but another thing that we have to consider I think is a gasoline tax, for conservation reasons and also not so incidentally as an important revenue-raising device.

When we talk about other things that we have to do in the energy field such as development of alternatives, these are going to be fairly costly. The R&D programs that have been abandoned by the Administration because they are too costly have to be restored. The lead times when we talk about shale oil or coal conversion are even longer than when we talk about opening new oil fields. That could be financed by a tax on gasoline. Other things could also be financed by that.

I would now like to return to the Iraq-Iran conflict. When I was here four months ago, I assumed that it was universally understood in the country and in the Administration that an Iranian victory would be catastrophic for the United States, not only from the point of view of energy supply, but from every other point of view. We now see that this is in error; that actions taken by the United States that has indicated to the Iranians and to everyone else in the world that we do not fear an Iranian victory, indeed we appear to be favoring an Iranian victory, let us look at the consequences of this.

When the Shah was overthrown in Iran, an Islamic Republic was formed—not an Islamic Republic of Iran; this is very important—just an Islamic Republic. This was to include all of the surrounding Arab States with large Shite populations. It was to include Iraq, Kuwait, and the eastern half of the Arabian Peninsula.

This position of the Iranians has not changed. Khomeini has said repeatedly that we must overthrow the hereditary monarchs in the Gulf. He has said that the liberation of Bagdad is the first step toward the liberation of Jerusulem from the Zionists, and of Mecca from the House of Saud. These positions have not changed.

If Iraq collapses right now and we have now taken action that makes this possible, if Iraq collapses this will be viewed quite universally in the area as a sign not of American stupidity but a sign that God had determined that the Iranians were to win this war, and everyone in the area I guarantee you will make an accommodation with this new political reality.

As Secretary Schlesinger said, when it comes to oil prices, it is not going to be any negotiation in OPEC on what we do, how we cut prices, how we cut production to maintain prices; it is going to be quite an explicit order coming from Ayatullah Khomeini to Kuwait saying your quota is 500,000; Saudi Arabia, yours is a million; and the price of oil is going back to the $34 that the Irans are now talking about, or it will go much, much higher.

The Iranians are—I do not use the word "fundamentalists" in connection with what is going on in Iran; it is not Islamic fundamentalism at all, it is a peculiar version of Islam as advanced by Ayatullah Khomeini, and it has very little, if anything, to do with the fundamental tenents of Islam. It is an obscurantist regime, and they are fighting against a government in Iraq which is resolutely secular. If they win this, and they might now, then the position of the United States in the Mideast will essentially be ended.

The CHAIRMAN. On that point, Ambassador, if the order goes out from the Ayatullah or his successor, will it be obeyed? In other words, can Iran get hegemony in the Middle East?

Dr. AKINS. I think there is absolutely no question about it. There are large Shite populations in all of the countries of Eastern Arabia. They will understand that—Saudia Arabia, one must remember, is a very small country. The indigenous population is only about 6 million. We will be talking about Iran with a population of 48 million conquering Iraq with a population of 15 million, and then we will have in the Gulf context a superpower. I think it is quite inconceivable that the Saudis or the Kuwaitis, or anyone else in the Gulf will say, we will not follow your orders; they will pull their forelocks and they will bow and they will do exactly what they have been told to do.

I know that some Israelis are now pushing quite another view. That is, that if Iraq collapses, the countries of the area will be so terrified at this new collosus that they will turn to Israel and the United States for protection. I think this is a very dangerous miscalculation of the area. Any leader in the Mideast who is already accused of being a tool of the United States, if he were to turn to Israel or the United States for protection, his own people would then be very susceptible to the propaganda coming from Tehran: This is proof that your people are tools of the imperialists.

No, I think there is no leader in the Middle East who would not agree to orders coming from Iran. I am including Syria and Jordan in this, as well as the countries of the Peninsula.

It is going to be very difficult for us to repair the damage that has been done. The military equipment that has been given to Iran is not trivial. We have given at least 2008 TOW missiles. A TOW missile is a very effective weapon against the only advantage that the Iraqis have in the war, and that is their superior armament.

More important than that, however, I think has been the effect that it has had on morale on both sides of the battlefront. The war has been going on for over six years now. The losses have been staggering. People on both sides of the border certainly would like to have the war end, but it is being pursued by Khomeini because he cannot give up his dream of a greater islamic republic.

Now we have intervened in this. We have shown that we can be manipulated by the Ayatullah. All travelers who have come back from Iran recently have said the same thing, that there is an intoxication in Iran. They have shown that they can manipulate the United States. They can get the United States to do exactly what they want.

Conversely, the effect on the Iraqi side of the battle is quite the opposite. They thought that we were tilting toward Iraq. They thought that the policy that we had enunciated publicly—that is, an absolute embargo on arms to Iran—-was the real American policy. Now they see that it is not.

The final offensive has not started yet, but the battle that is going on now in front of Bashra is very important. As far as I know, I talked to the Iraqi Ambassador yesterday, and he thinks that the missiles that we have given to the Iranians have not yet been used. They are being held in abeyance for the final battle, which may come in the next few days or the next few weeks.

The effects of the collapse will be quite quick. I think that—in a sense I hesitate to say this, but I think that this would rescue the American oil industry if Iraq were to collapse. I think at that time, it would be a general recognition of the danger that the United States is in, and I think there is not, yet.

But the other consequences of this for the United States are our oil supply, our political posture in the Mideast are so horrendous that I do not want anybody to think that there is a silver lining to the Iraqi collapse. There is not.

Our terrorist program is in shambles. That is not what I intend to talk about, but that really has to be restored as well. But we also have to restore the American position on the war, the official position that Secretary of State Shultz has said repeatedly to the people of the Mideast and elsewhere, that is, Iraq must not collapse; we must stop the delivery of arms to Iran. That has to be reenunciated very forceably by the Secretary and the President.

If that is done, if we say we will take action against anybody who diverts arms to Iran, then—then—if we have time, the morale in Iran may have a setback and the morale on the Iraqi side of the border may be boosted. But there is not too much time for that. We have lost so much time. We have convinced ourselves for the last several years, probably since 1981, that the oil problem was solved. We have allowed the domestic industry to collapse.

The oil service industry is in a shambles, and we have very, very little time to do anything. We have no time. It is already too late to take appropriate action. But there is no excuse for any further delay. Secretary Schlesinger said he thought we should talk to the IEA. Well, I will not fight him on that one, but I think Senator Nickles was absolutely right when he said the chances of getting an agreement are very slim. We will try. I say, fine, try. But not for longer than two weeks.

Then, after it fails, then we go back and do what we have to do to protect ourselves. I have lots of examples I can give you, even in the energy field, of how important it is for us to take action to protect ourselves, not to wait for cooperation with our Allies.

Thank you.

The CHAIRMAN. Thank you very much, Ambassador Akins. I think you have painted a particularly compelling picture of what happens in the Middle East if Iraq falls, a situation that this country seems to be bent on trying to bring about, and the implications of that are just absolutely staggering. Certainly nothing good will come of that.

I agree with you. I do not see how you can avoid having Iran dictating OPEC policy. At that time, you may really have discipline in OPEC. Now in the meantime, in the event that Iraq does not fall, and there seems to be a real chance that they will hold at Basra, Iran will be so depleted of men and material that they will go into a stalemate there perhaps for years standing.

If that is so (and they must rely upon OPEC as a cartel, as an existing cartel) why is there any greater reason now to think that OPEC is going to be able to enforce its discipline? I have referred to OPEC in the past as an honor system among thieves. I do not mean to say that all OPEC members are like that, but I do mean to say that when you have countries like Nigeria which are teetering on the edge economically, how is OPEC going to be able to enforce its discipline? So many countries are teetering on the edge economically. Their very survival is subject to getting a few extra dollars in order to prop up the government when the premium on cheating is so great, when the enforcement mechanism is so lax, and when there are 10 million barrels a day of excess production which can be sustained immediately, (or 20 million of installed capacity at excess production, that is, that which is design capacity).

Dr. AKINS. Well, the situation in OPEC is not unlike it was in the United States in the early 1930s, and various states that produced oil, or extracted oil set up a system of limitation of production in order to maintain prices, and that worked very well in the United States.

It is not all that different from the situation inside OPEC today. The real difference, however, is that, and I talked about this when I testified in September, was that OPEC has now gone through a price war. They have gone through the blood bath. They know exactly the consequences of noncooperation, and they are quite determined I think in almost every case to make sure that this agreement lasts.

This is the alternative that they are facing: Do we go into another price war, another blood bath while the prices drop to $5 a barrel? And even if we produce at capacity, we are going to have very little income. Or, do we cut, as they are doing now, their production quotas by 17 percent, and then raise the price to $18, $20, or $25 a barrel?

Well, the arithmetic is irresistable for the people in OPEC and outside of OPEC. Taking Nigeria explicitly, I talked to the Nigerians about this and they said, we cannot, cannot stand another price war. We will be destroyed if the price of oil collapses, and we, the person I talked to was a minister in the government, said we have taken a cabinet decision and we have sworn we will stick to our quota if the price goes to $5 or $35 a barrel. Okay? No guarantee that they will do this, but they do understand the consequences of a price war because they have just gone through one.

The CHAIRMAN. Should we be trying to establish better relations with Iran because of its strategic importance? And in that connection, are there moderate elements in Iran with whom we can and should and are able to deal?

Dr. AKINS. I do not think there are any moderate elements in the government. The people we have been dealing with are people who are at the very top of the government. Rafsanjani is perhaps sometimes viewed as one of the moderates, but there is no possibility that Rafsanjani did what he did with us without clearing every single step with Khomeini himself.

There are a lot of things I think we should be doing in Iran, but not giving arms to the government. There are certainly elements in Iran who are totally opposed to the Ayatullahs, and these are the people we should be working with, but clandestinely, and I trust that we are. But this is something that I do not know about, and if I did I would not be discussing it in an open hearing.

The CHAIRMAN. How stable is the regime in Iran? In other words, when the Ayatullah leaves, and I understand he is very, very sick and will probably be gone sometime during the year, if that is so——

Dr. AKINS. If God is merciful.

The Chairman [continuing]. If that is so, will his successor, whoever he is, be likely to carry on his policies? And will there be internal decay, internal dissent, internal pressure to change those policies?

Dr. AKINS. Well, my personal view is that there will be a change. There is some evidence that there are people who are somewhat more pragmatic, and you might call them more moderate. The losses to Iran of the war have been horrendous, and the people in the country certainly would like to have the war ended.

The successor to Khomeini will certainly not have his charisma, not have his role in the country or the area that Khomeini himself has, and he will not have his role in the country or the area that Khomeini himself has, and he will not have Khomeini's obsession with setting up an Islamic republic or the destruction of the Baath Party leadership in Baghdad. So there could be some changes. I think there will be some changes.

But I should point out that people I know who know Iran very well, including Iranians in exile, and people I respect, disagree with this theory very strongly. They think that it will be a long time before there is any change in the Iranian view.

The CHAIRMAN. Thank you very much.

Senator McClure.

Senator MCCLURE. Thank you very much, Mr. Ambassador.

I realize that as a member of the Select Committee investigating the entire Iran affair that it is encumbent on me to withhold judgments and perhaps be cautious in statements, but I am going to violate that rule just a little. It is a self-imposed rule, but you make reference to something that I think is perhaps real in perception, but perhaps not real in substance, and because perceptions flow from comments, because they are either accepted and bulwarked or rejected and weakened, perhaps I ought to at least make this much of a statement at this time.

That is, that I do not know that it is so clear that it is United States policy that Iran ought to win. My own perception is quite different from that. I am not even certain in my own mind that it is clear that Israeli policy is that Iran ought to win. I thought it was probably Israeli policy that that war should go on forever; as long as they were fighting each other, they cannot bother Israel.

Perhaps my perception of Israeli policy is wrong, but if indeed perceptions are setting in throughout the Middle East, perceptions that it is the United States' policy that Iran should win, or that we are not afraid if Iran should win and are not concerned if Iran should win, that certainly would impel changes of attitude and perhaps real changes on the ground. And for that reason, I think it may be important for us, while pointing to the dangers of such a policy if it does exist, to refrain from saying that such a policy does exist, because I do not believe it is plain that such a policy does exist.

That is part of the reason why the Select Committee was created, was to look into that and make that determination. As I said earlier, all we have done, so far as of this morning is to hire a Chief Counsel. The investigation will proceed, but it has not yet proceeded.

Now with that much of a statement, and not being quarrelsome about it, but simply to indicate some elements that watch the United States very carefully, that perhaps that perception is wrong, that indeed there may be a more moderate interpretation of—and I stress "may be" because I am not trying to draw conclusions—may be a more moderate interpretation of the U.S. actions, then maybe we do not get the same reaction in the Middle East.

Do you believe that it is the Israeli Government policy that Iran should win?

Dr. AKINS. Let me talk about the American policy first.

Senator MCCLURE. Sure.

Dr. AKINS. I think that there are certainly people in the American Administration, most probably including Secretary Shultz himself, who believe very strongly that Iran should not win. This is why I said that in order to change this perception in the Mideast and elsewhere, particularly in Iraq and Iran, we need a ringing statement from the Secretary and from the President himself reaffirming the policies that we told the world were our policies three months ago.

As far as Israel is concerned, Israeli policy apparently was for a long time that the war should last forever, that they should always aid the weaker side until the last Iraqui kills the last Iranian. But I think there has been some understanding in Israel that a permanent stalemate cannot exist, and that if there is a long stalemate that eventually the bigger country will win, which is Iran.

There seems to be some shifting of opinion in Iran that this would not necessarily be—in Israel, that this would not necessarily be bad for Israel; that if Iran does win, that Israel can make an accommodation with the surrounding states, because they will be so terrified of an Iranian victory, that Syria, Jordan, and the states of the Peninsula will turn to Israel for support.

As I say, I think if that is the Israeli position, it is extremely dangerous and totally wrong. But I thought their policy of aiding Iran in the past, which they have been doing for quite some time, since 1979, was also very dangerous, against our interests, and we should have put pressure on them a long time ago to stop it.

Senator MCCLURE. Well, I had noted in your earlier statement that you had indeed indicated that you understood Secretary Shultz to be opposed to any policy that would end up with aiding Iran in their war with Iraq.

Dr. AKINS. Indeed.

Senator MCCLURE. You also indicated in your response I think to Senator Johnston's question that you hoped indeed that there were some, I have forgotten the term you used, some quiet contacts with elements inside Iran, clandestine is I think the term you used. How do you manage to keep clandestine contacts clandestine?

Dr. AKINS. In this government?

Senator McCLURE. In this government, in this country.

Dr. AKINS. Well, it is very difficult, clearly.

Senator McCLURE. If you have contacts with somebody in Iran today and it is then published in the newspaper, are you not likely to lose those contacts?

Dr. AKINS. You certainly are.

Senator McCLURE. If indeed they are moderate contacts——

Dr. AKINS. Yes.

Senator McCLURE [continuing]. Opposed to that government, they would be gone immediately, would they not?

Dr. AKINS. There is no question that if there is somebody that we are working with in Iran today, that he is very, very fearful of seeing his name in the New York Times tomorrow. If he does see it there, he is not going to live very long.

Senator McCLURE. Which makes it very difficult for a country like ours to maintain any kind of clandestine operation, or clandestine contact.

Dr. AKINS. Yes, indeed.

Senator McCLURE. But I think policymakers have to be aware of that danger. Rather than blaming newspapers, we have to assume that they will do what they do. If they get wind of such a thing, it is going to be in the newspaper. I do not always appreciate that, but I think it is a fact, and I think policymakers must keep that in mind. That includes Congressional policymakers who have to be willing to support clandestine contacts.

Dr. AKINS. Right.

Senator McCLURE. I say that, not just in the context of what has already happened, but in order to preserve our capacity to make contacts that are in our best interest, and do it without them being publicized for whatever reason they may be publicized.

You mentioned a moment ago one thing which I think is wrong, and maybe I misunderstood what you said, that the majority of U.S. oil does or will come from the Persian Gulf, imported oil.

Dr. AKINS. Yes, this was the statement that the Under Secretary of Energy made in September. That is, by the early 1990s we will be importing around two-thirds of our consumption, and most of that would be coming from the Persian Gulf.

Senator McCLURE. Most of the world's, a dominant portion of the free world's old supply will come from the Persian Gulf——

Dr. AKINS. Right.

Senator McCLURE [continuing]. But we have to have many people appointed to the diversification of supply as we have pulled away from Gulf sources, and have increased our buying from places like Mexico, Indonesia, Nigeria, and others that are outside the Gulf area. But the very fact that we have done that has given some people a false sense of security, because they forget that in the period of crisis or shortage, the world's oil supply is almost totally fungible.

Dr. AKINS. Right; absolutely.

Senator McCLURE. It will flow to the markets where the price is the highest, regardless of our past arrangements. Is that correct?

Dr. AKINS. Absolutely. We are also talking about a situation where we are importing considerably more than we are today, and the area that has the great capacity for expansion is not Nigeria, or Indonesia, but it is the countries of the Persian Gulf. If the world demand goes up for imported oil, the whole world is going to be turning to the Persian Gulf.

Senator McCLURE. Well, I remember—that is one of the problems with being around for awhile, you remember more, until the point you begin forgetting more—the embargo period in 1973–74, the rumors that were rampant around this town, and I suspect every other policymaking center where rumors abound in the hopes of influencing policymakers, if not created by policymakers, rumors of ample supplies in tankers circling offshore anchored in the Chesapeake Bay. While those rumors were mostly proven to be false, they had a certain amount of currency and a certain amount of credibility, and they are based upon a recognition, too, that if you own a cargo of oil on a million-barrel tanker and it is in the Mid-Atlantic, and by circling for ten days you can divert to Rotterdam instead of to a port in the United States and thereby get $5 a barrel more, you have just made $5 million. I suspect there are a good many people who have oil on tankers, or in the pipeline somewhere, that are quite willing to divert supply from where they were intended to go to a point of higher economic opportunity. Is that not correct?

Dr. AKINS. Absolutely. I have never had very much regard for the potential effectiveness of the IEA during a real crisis. The sharing mechanisms have been worked out, but whether they will be honored in time of a crisis I think is highly questionable.

I think that if there is a shutoff of oil from the Persian Gulf side, we will enter into a wild bidding war for the available oil, and a contract that we have with Nigeria, say, or Indonesia, or even Mexico, just may not be honored if the Japanese offer $5 a barrel more than we have offered.

Senator McCLURE. In 1973–74, and again in 1979, I was struck by how little our government knew officially about where the oil supplies were. They did not have a list of tankers. They did not know where they had loaded, or where they were going. I had hoped over the years that we were doing better than that. Just a short while ago we had a United States Navy helicopter in the Persian Gulf fired at by a missile on board a tanker, and to the best of my knowledge we have not yet figured out whose tanker it was, or why they fired, which is startling to me.

But if indeed we do not know where those tankers are today, at least our Government could do what I did in both 1974 and 1979, I went to London and talked to Royal Dutch Shell. They knew. And by way of punctuation to that comment, we did have a closed hearing the other day. I do not like leaks from closed hearings, and I am not going to contribute a leak concerning that closed hearing now, but I will just say to the ladies and gentlemen who are present in this room and those who may be listening, we did not learn anything, so there was not anything to leak. [Laughter.]

Which may be the only reason you have not heard a leak. I do not know about that. But I am startled. I am startled that our government through several Administrations and through several different agencies fails to have any accurate track of what supply and demand is on a current, daily basis. They read the IEA and Energy Information Agency published statistics. They are valuable, and they are behind times, and they reflect the reports filed by other people, and I am not joining those who are beating up on oil companies now as being the great evil, or the great satan, if I can borrow Khomeini's term. It is just that we fail to perceive our vulnerability. And if we do not have accurate information, we do not have an accurate measure of how vulnerable we are.

Your voice, unfortunately, has not been heard strongly enough—in my opinion, was not heard strongly enough while you were our Ambassador. That is not a fault of a single Administration. I think what you are saying flies in the face of some conventional wisdom, or desired perception, so they do not wish to hear what you say.

Dr. **Akins**. Yes. I think, Senator, that that is exactly the problem. That is, nobody really likes to hear unpleasant news. If you have Secretary Schlesinger and me come here and tell you that we are facing an absolutely catastrophic situation in a very, very short term, five years under the best of circumstances, and it could come of course much, much sooner if the Iraq-Iran war develops adversely.

On the other hand, you have senior petroleum economists telling you that there is no problem. OPEC cannot get its act together. There will be no shortages. The glut is permanent. It is very tempting to listen to the person who tells you there is no problem, because any of the solutions that we are talking about are going to be politically inexpedient. They are going to be unattractive to a large part of the electorate.

A politician is not going to want to talk about higher gasoline prices, or an oil import fee, because that would be interpreted as protecting special interests, not protecting the United States but protecting the oil industry. These things are very, very unpleasant. Nobody likes to do them. If they can rely on a senior petroleum economist who says there is no problem, he relies on him.

Senator **McClure**. In your opinion, is it possible for Iraq to expect to increase their exports of oil in the current situation?

Dr. **Akins**. Iraq?

Senator **McClure**. Iraq.

Dr. **Akins**. No, I think Iraq is going to be in a very difficult position if this war continues, because the Iranians are almost within shelling distance of the fields of southern Iraq, and Iraq's exports could be stopped, or could be cut very dramatically quite soon.

Senator **McClure**. Is Iran in a position where they can increase their exports?

Dr. **Akins**. No. The Iraqis have been very effective in attacking the fields in Iran, and the loading facilities on Haag Island. They had not been, for the first five years of the war, but the last year they have been very effective. The Iranian production right now seems to be considerably below their OPEC quota. That is another of the reasons why the price is high.

Senator **McClure**. What, if anything, can we read of Saudi intentions from the firing of Oil Minister Yamani and the appointment of Oil Minister Jhenmeiser?

Dr. AKINS. Well, let me tell you what it was not, first. The American press reported he was fired because of pressure from Iran. It had absolutely nothing to do with that. The Petroleum Intelligence Weekly carried the report a month or so ago that the real reason he was fired was because at the time of the last OPEC meeting in December the King, King Fahad, told him to go to Geneva, get a higher quota for Saudi Arabia, and also raise prices. And Yamani is alleged to have said, this is not possible, Your Majesty, I can do one or the other, but I cannot do both.

Whereupon, Fahad said, I will get myself a minister who can. That is also totally incorrect. It implies that King Fahad is a fool, and Fahad is not a fool. No matter what he is, he is not stupid. His new minister, Jhenmeiser, went to Geneva with one goal, not to raise the Saudi quota—that was never, ever mentioned—but to raise the price, and the price was to be raised by an additional cut of 7 percent in production quotas of everybody including Saudi Arabia.

There were a variety of personal reasons. Yamani has not been very popular for a long time in Saudi Arabia, and a cumulation of statements that Yamani made and things that he did resulted inevitably I think in his removal, but not because of pressure from Iran, and not because the King had some unrealistic economic view.

Senator MCCLURE. Is it true that Iran has in the past resisted the reduction in their production that OPEC was trying to impose?

Dr. AKINS. Well, not really. In a sense it is irrelevant, because Iran is incapable of producing its current quota. The problem has been that Iraq wanted to increase its quota. The Iraqi quota was set several years ago when Iraq had no possibility of exporting oil. The Syrians had cut the pipeline to the Mediterranean because of their associations with Iran, and the Iranians had destroyed the loading terminals in the south. So the Iraqi quota was set at 1.2 million, but Iraq was incapable of producing so much.

There was an understanding, however, that once Iraq had the facilities, that the Iraqi quota would be increased. There was a general concensus in OPEC that the Iraqi quota should be increased. The only dissent was Iran itself, which said that Iraq should not have any increase, or if any increase were given to Iraq the Iranian quota had to be twice the Iraqi quota.

The Iraqis, on the other hand, asked that their quota be raised to the level of Iran's. They did not put it in those terms, but that is what it meant. And nobody in OPEC agreed with the Iraqi request. The Iraqi quota was 1.2 million. They wanted it to be raised to 2.3 million. The concensus inside OPEC was that Iraq should have about 1.7 or 1.8, which is about what they are producing today, although they have not accepted that. They still are talking about a 2.3 million quota.

But even given OPEC's rules, given the new formulas that they have developed on setting quotas for the individual countries based on historical production, on proven reserves, on population, none of these criteria would justify an Iraqi quota the same as the Iranian quota. And I think the Iraqis are being quite unreasonable about that at the moment.

Senator McClure. Thank you very much. I appreciate your appearance, again.

The Chairman. Senator Nickles. Before you ask your first question, let me say to Ambassador Akins, I have got to go host a luncheon. We appreciate very much your testimony, which like Secretary Schlesinger I was not at all disappointed. I thought you would have a very salient message for us, and you did. I hope the word of this gets out among a broader reach of colleagues in the Senate, as well as the country.

Thank you very much for coming.

Senator Nickles. Mr. Chairman, before you leave, I think it would be of interest to invite the Administration for this same hearing.

The Chairman. Yes. They are being invited, or have been invited.

Senator Nickles. Do we have a date yet?

The Chairman. Yes. We are really waiting for that study and that was the reason we did not have the Administration as the lead-off witness.

Senator Nickles. Well, I look forward to that, and look forward to working with you on that hearing. Thank you very much.

Ambassador Akins, just a couple of real quick questions. In your statement you said one thing that concerned me a little bit. You said we should not repeal the windfall profits tax. I would like to give you ample opportunity to qualify that.

Dr. Akins. I did qualify it.

Senator Nickles. Well, I want to make sure the qualification is heard. You were saying we should not repeal the windfall profit tax if we had an import fee or a minimum price for oil of say $25?

Dr. Akins. Yes, that's right. I also said that the windfall profits tax should apply only to profits from the industry that were not reinvested in the industry. Anything that is reinvested, of course, is not to be so taxed. The purpose of this would be to protect the industry, give it money, but the point of retaining the windfall profit tax would be to ensure that the money not be diverted to things that had nothing to do with oil—buying insurance companies.

Senator Nickles. I somewhat heard that, but I did not want to—we will be wrestling with that on the Floor one of these days. Last year we were successful in the Senate, and not successful through the House. That is also on this Senator's agenda for this year, as well. I did not want somebody coming back and quoting yourself as an expert saying we should not repeal the windfall profit tax.

Dr. Akins. No, no. It was in the context of a variable import fee. Maybe we should abolish the windfall profit' tax and call it something else, and just require that the industry reinvest its profits in the industry itself or be subject to a punitive tax.

Senator Nickles. Under present law, if the price of oil gets above $19.40, the windfall profit tax will take 70 cents of each incremental dollar on old oil, which is absurd, but that is still present law.

Dr. Akins. True.

Senator Nickles. And it needs to be repealed. So I appreciate your clarification.

You mentioned Iraq's quota was 1.2 million barrels per day? Is Iran's 2.3?

Dr. AKINS. Yes, 2.3.

Senator NICKLES. Iran is presently producing, you said, not up to quota?

Dr. AKINS. Way below that. While their exports were about 200, 300,000 barrels a day. They are somewhat higher than that now, but they have domestic consumption of about 600,000–700,000. So for awhile they were producing under 1 million.

Senator NICKLES. The quotas are on exports, are they not?

Dr. AKINS. No. Quotas are on production.

Senator NICKLES. Total production?

Dr. AKINS. Yes.

Senator NICKLES. All of their exports go through Kargeilen?

Dr. AKINS. No, they do not. They have some oil fields further down in the Persian Gulf, and they have a facility as Syri Island for loading, but basically Syri is used as transshipment from Haarg. The Iraqis have not been very effective in attacking Haarg Island at night, and so the tankers will come into Haarg, load at Haarg, and then under cover of darkness go down to Syri where until recently they have been beyond the range of the Iraqi fighters. The Iraqis have now attacked Syri.

The Iranians are now in the process of building a pipeline which will go through Iran from the oil fields which are very close to the Iraqi border, through Iran, down to probably on the other side of the Straits of Hormuz, which would put them well beyond the range of the Iraqis, but that will not be finished probably for another year.

Senator NICKLES. You mentioned the catastrophic results if the Iranians were successful in conquering Iraq. What kind of probability do you give that?

Dr. AKINS. Well, at least 50 percent.

Senator NICKLES. You also mentioned that if that should happen, that almost instantaneously they would have that much power control over OPEC. You are assuming that they would—I have a hard time with that. I still see the Saudis as playing the major role with OPEC with their production, and I do not see necessarily a successful Iranian roll. If the Iranians are successful in Iraq, I am trying to see how that would automatically apply to having control over the Saudis production.

Dr. AKINS. Well, the two largest countries in the area are Iraq and Iran. At the present time, they are more or less neutralizing each other. Both countries have had basically the same idea toward oil prices, even while the war was going on. That is, there should be restrictions on production, and the price should be held quite high.

Once the war is over, and I think there are only two ways the war can end, one is basically a restoration of the status quo ante, and the other is an Iranian victory, an Iraqi victory I think is totally out of the question and has been from almost the very beginning of the war, but if Iran dominates Iraq, Kuwait will be right on the border of this new collosus, and Saudi Arabia will just be to the south of it.

The population of the Eastern Province of Saudi Arabia, which is where the oil is found, is very—perhaps I should not say very largely Shiite, but there is an extremely large Shiite minority in the area. These are people who in the past have looked to Khomeini for guidance. If Iran were to win the war, I have very little doubt that these people would interpret this as a sign from God that he wanted an Iranian victory, he wanted Iran to set up an Islamic Republic, and these people, some of them, not all, but some of them would certainly say we will do what the Ayatullah wants us to do.

Senator NICKLES. What percentage of the population would that be?

Dr. AKINS. In the Eastern Province? Oh, certainly half. Theoretically in Saudi Arabia there are not any Shiite, because Saudi Arabia is a resolutely Suni government, a traditional Islamic government, and theoretically there are not any Shiite. One of the figures I found very difficult to find when I was there, and I asked a number of people—you have to ask them privately what the figures are, and you get very different views. The lowest figure I got from a person whom I trusted, and I thought was in a position to know, was 20,000, and the highest figure was 800,000. You see, there is an extraordinary range in opinion of how many are there.

The figure that I have been using is around 600,000, which is more than half the population of the Eastern Provinces.

Senator NICKLES. That is interesting. That still would not, though, as long as the King was in control, the Saudis still control, as far as I am concerned. They have the power, the control to greatly increase production——

Dr. AKINS. They do.

Senator NICKLES [continuing]. As far as OPEC is concerned.

Mr. AKINS. Absolutely. And that will always be the case. The question is, will they have the political will to do it? If the Iranians are saying we have now taken over Iraq, the biggest country in the area, we do not think that you should be producing so much oil, furthermore we think that you are an illegitimate ruler, which is what they have said, we are considering replacing you in Mecca, is Fahad under these circumstances going to turn to us for support, thereby proving in the eyes of his own people that he is an agent of the United States? Or, is he going to say, let us see if we cannot work out something, Mr. Ayatullah.

I suspect that it will be the latter course. In fact, I am quite sure it will be.

Senator NICKLES. That is an interesting supposition.

Thank you very much for your appearance before this Committee today. We are adjourned.

Oh, Ambassador Akins?

I am sorry, Frank.

Ambassador Akins, Senator Murkowski would like to——

Senator MURKOWSKI [presiding]. I am sorry. I appreciate that, Senator Nickles, and Ambassador Akins. I was out in the other room briefly, and I want to first of all indicate that your testimony was fascinating.

As a member of the Foreign Relations Committee and the Intelligence Committee, as well, I wish both my colleagues could have heard your presentation, because I think it brought a very real picture of the potential realities that are in existence in the Mideast.

My question—I do not believe it has been asked; if it has, I do apologize—is, in view of your statement that I think was that Iran indeed can manipulate the United States, or they have that belief currently, or that perception, what is the chance of the Iraqis turning to the Soviet Union in a rather rapid manner as a matter of desperation? Is that a risk?

Dr. AKINS. Yes. I think there is a risk that Iraq will turn to anybody who gives them real support. But I think the Soviet Union is probably not in a position to give them any military support. That is, to move in militarily. I think it is more probably that Iraq will turn to some of its neighbors and ask them for support, if they are about to collapse. That is, to Jordan, which I think will probably give them some; to Egypt, which very likely will give them whatever it can spare; and to Saudi Arabia and to Kuwait, who have fairly large, efficient air forces. And here I am just not so sure they will get any support.

But I do not think the Soviet Union is going to intervene militarily. It is not a question of sending them more arms. They have the arms that they need at the moment. The current battle that is going on is crucial, and if the Iraqis do not collapse, then I suppose they are going to be looking to other people for more arms, the Soviet Union, France, or anybody else who will sell it to them.

Senator MURKOWSKI. Well, in your——

Dr. AKINS. I should point out that Iraq has had very, very bad relations with the Soviet Union. When the Soviets invaded Afghanistan, I think the strongest statement made by any leader in the world, including the United States, came from Sadam Huesein, the President of Iraq. He condemned the Soviets in absolutely extraordinary terms.

When the war started, the Soviets, although they had a pact with Iraq, a military supply pact and agreement, the Soviets stopped deliveries of arms to Iraq for two years. They have resumed, subsequently. As I say, that is in the past, and the Iraqis will take arms from anybody who will give them to them today.

Senator MURKOWSKI. I gathered in your presentation that the timetable, although uncertain, was certainly a crucial one from the standpoint of the position of Iraq in the escalation, and now you infer that the Soviet Union may not come in with military assistance, certainly arms, and I gather from your statement that the concern we have is the will of the Iraqis in view of their perception of the role of the United States. And we say Mr. Schlesinger comment on the matter of the United States avoiding a role, a major role in the political stabilization in the Middle East, which leads one to question those that are experts in the field as to just—if the Soviet Union is unlikely to play a role in Iraq, our role currently is one I assume of treading water as a consequence of the embarrassment of late.

The Israeli role is apparently already established. Is it likely in your analysis that as a consequence of the quasi-polarization of the Soviet Union, the U.S. and Israel, that this thing will pretty well reach its inevitable conclusion without the exerting of outside forces as a consequence? I think you said the will of God? Maybe that is an extraordinary thing to suggest, but that appears to be. It is just coming out the way it is coming out because nobody is stirring it up.

Dr. AKINS. When I said I did not think the Russians would intervene, I meant I did not think they would send their own troops and their own planes in to protect the Iraqis. That would be an extreme case. I think that is unlikely.

The Soviets, like the Americans, have interests in the Arab world and in Iran. The Soviets, I should say the Russians have had an interest in Iran that go back 300 years. They would like very much ultimately to have their ports on the Persian Gulf. I do not think there is any reason to assume that the Russians have given up this 300-year-old dream.

So they do not want to take any action that is going to alienate the Iranians permanently by tilting too heavily toward Iraq. I do not know if this is the time perhaps to raise this, it is really a subject for another committee, but my personal view is that the rule of the Ayatullahs in Iran is distinctly limited.

Iran has gone through periods of religious excess many times in the past, and there has always been an internal revolt against them. Khomeini has said repeatedly that a Muslim should devote himself to work and to prayer. Any of you who know Iranians know that they have interests that go well beyond those two narrow fields.

Ultimately, the Iranian genius, the Persian genius is going to reassert itself, and the Mullahs are going to be overthrown. They are going to be killed, and they are going to be pushed back into their Mosques.

I think the Russians are waiting for that moment. Because as the dissatisfaction with the Mullahs grows, and it will be inevitable, it is inevitable, people are beginning to talk about the alternatives to the Mullahs, and people are saying now in a fairly close analogy to what they said in the last days of the Shah, that is, anybody but the Mullahs. We will turn to the communists, if this is the only way of getting rid of the Mullahs. This is why I referred briefly to the necessity of doing work in Iran. There are lots of things that we could be doing, but not working with Mullahs; but working with the people who want to get rid of this obscurantist regime.

Senator MURKOWSKI. My last question, Mr. Ambassador.

In assessing the U.S. position currently where our Secretary of State has indicated, and I think this is a statement that was brought out this morning, will not support arms to Iran, that Iraqis must not lose that war, what in your opinion should be the role of the United States at this time?

Dr. AKINS. I think that is precisely the right thing to have done.

Senator MURKOWSKI. Now that is to do nothing?

Dr. AKINS. No, it is not to do nothing. It is to interdict arms' deliveries to Iran. That is something. Put pressure on all the countries that are doing it, and have been doing it, particularly those countries that have been diverting American arms to Iran. That should be stopped.

Senator MURKOWSKI. Such as what countries?

Dr. AKINS. Pardon?

Senator MURKOWSKI. What countries would you include?

Dr. AKINS. Israel is certainly the prime country. If Israel stops this, then this will deprive the Iranians of very important armaments that they need.

Senator MURKOWSKI. We have not had that assurance from Israel? Is that correct?

Dr. AKINS. I do not know. I do not know. The only thing that I would add to that would be that I would also like to have the President make the same statement. That is, our policy is as we have officially stated it. This was an aberration, the arms deliveries. He can call it a mistake, or whatever he likes, but we have to make the world understand that this is a policy that has now been stopped.

Senator MURKOWSKI. And you feel that we should then use our influence to ensure that no other countries provide Iran with arms?

Dr. AKINS. That is right.

Senator MURKOWSKI. How about the Soviet Union providing assistance to Iraq?

Dr. AKINS. Well, for the last five years Iraq has tried to—Iran, by the way, is also getting arms from the Soviet Union. That is, from North Korea and from Vietnam, and from Lybia, and from Syria, all of whom got their arms from the Soviet Union. So it is not that the Soviet Union is tilting all toward Iran, far from it. They are selling arms to both sides—"selling," by the way, not "giving." Selling at very high prices.

So there is very little we can do about the Soviet Union. As far as Iraq is concerned, the Iraqis for the last five years have made it very clear that they want peace with Iran on any terms except the destruction of Iraq. Destruction of Iraq is not something that you can really advocate to them.

Senator MURKOWSKI. So you feel, in conclusion, that our current policy is a correct one as enunciated by the Secretary of State?

Dr. AKINS. Today.

Senator MURKOWSKI. Today.

Dr. AKINS. Yes.

Senator MURKOWSKI. And your recommendation would be that we use our influence, wherever we may have it, to curb any arms going into the conflict I assume to either side?

Dr. AKINS. Yes.

Senator MURKOWSKI. And that should be the extent of our involvement. Is that correct?

Dr. AKINS. That is right.

Senator MURKOWSKI. Thank you.

Dr. AKINS. The Secretary met with the foreign minister, the Secretary of State met with the foreign ministers of the Gulf Cooperation Council on the first of October, and he reiterated that as our policy. That is, we must stop the flow of arms to Iran–not to Iraq; but to Iran–because, he said, and he said correctly, that the only way of stopping the war is to deprive Iran of the military means of pursuing the war.

He also apparently condemned the Soviet Union very strongly for its hypocracy in saying that it wanted the war to end, and yet allowed its satellites to deliver arms to Iran. The Arab Foreign Ministers were quite pleased with this. It was reported back to their heads of government, and then very shortly thereafterwards the scandal broke.

Senator MURKOWSKI. Well, I cannot conclude without saying "what if" one more time.

What if we did exert our influence to the point of curbing arms sales coming in from the Israelis and other countries that we have a relationship with, and we were satisfied that the effort was working? And then what if the Soviet Union decided to supply Iran with substantial arms to the point that Iraq was dependent upon whatever they could pick up from commercial arms dealers throughout the world? At that point, it would be evident that the Soviet Union was embarking on a policy decision.

Should we then take any action to help Iraq? Or just stay out of it and let it happen?

Dr. AKINS. Help Iraq? That is a hypothetical.

Senator MURKOWSKI. Surely.

Dr. AKINS. It is not impossible, however, but I think it is unlikely because I do not think the Soviet Union wants to be associated with these people–that is, with the Mullahs. I think they probably have concluded, as we should have concluded, that anybody who is too closely associated with the Mullahs is going to have trouble in the post-Mullah era.

I think the Soviets are keeping their distance from the Mullahs waiting to move in after the next revolution occurs in Iran.

Senator MURKOWSKI. Okay, so you are not prepared to say "what if," what if the scenario did occur?

Dr. AKINS. Well, it is totally impractical. That is, if it were to happen, I would like to see us urging the Saudis and the Kuwaitis and the other Arabs to come militarily to Iraq's assistance, using American equipment.

Senator MURKOWSKI. Using American weapons. Thank you.

I guess I do not have anybody to thank but you. I appreciate the fact that you were able to accommodate me, and I wish you a good day, Mr. Ambassador.

Thank you.

[Whereupon, at 12:21 p.m., the hearing was recessed, subject to the call of the Chair.]

WORLD OIL OUTLOOK

WEDNESDAY, MARCH 11, 1987

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 10:03 a.m., in room SD-366, Dirksen Senate Office Building, Hon. J. Bennett Johnston, chairman, presiding.

OPENING STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The CHAIRMAN. The Committee will come to order.

I am pleased to convene today's oversight hearings on the world oil outlook. As far as I am concerned, this subject is vital to this Nation's present and future well-being. Everywhere one turns one finds evidence that the United States is sowing the seeds of the next energy crisis, and we seem unwilling to pay attention to, let alone do anything, about it.

Every analyst I have heard from paints a depressing picture of the prospects for domestic oil production. We see inevitable declines in production coupled with increasing demand. The result? We can expect increasing levels of oil import dependence, and those imports will most probably come from the Middle East.

Dependence upon the most unstable part of the world for one of our most basic commodities has severe energy and foreign policy repercussions. That prospect alone should be enough to frighten even the most hardened free market supporter.

The Administration has undertaken a comprehensive look at U.S. energy security. The long awaited, and I might add long overdue, report will finally come in next week. They have been evaluating the situation before us by attempting to quantify the costs of various policy options. We will be hearing from them once their report is released, and once we have had a chance to digest it.

I might say that I understand the results of that report have been predicated by the White House. That is they were to make a study on the situation but the conclusions was no oil import fee, and that was dictated by the White House.

In any event, during the coming weeks I hope that the Members of this and other Congressional Committees will focus on the prospects for our Nation's energy future in the broadest possible context.

How does our energy future fit into the budget deficit situation?

How does our energy future fit into the overall trade picture, particularly with respect to trade deficits?

We are now importing over 4 million of barrels of oil per day. The latest balance of payments' figures tells us that we have an annual trade imbalance due to imported oil of $25 billion per year. Unless we take steps to decrease imports, that 4 million barrels a day will quickly become 5, then 6, then 7, and who knows where we stop.

Our trade imbalance will skyrocket no matter what type of "competitiveness package" the Congress enacts.

Today's witnesses are among the foremost energy number crunchers in the United States. We have asked them to share with us the current predictions about the world oil outlook, and to tell us what those predictions mean for domestic energy supplies.

I look forward to hearing their testimony, and I am pleased to welcome first an old friend of this Committee, and an old adviser to this Committee and to the world, Dr. John Lichtblau, president of the Petroleum Industry Research Foundation of New York.

Dr. Lichtblau, we are delighted to welcome you.

Dr. LICHTBLAU. And I thank you for inviting me.

The CHAIRMAN. We also will have our other two members appearing as a panel. So before you begin your statement, I would like to welcome Dr. Scott Jones, who is Vice President of Energy, Metals & Materials of Chase Econometrics, Inc. of Bala Cynwyd, or however one pronounces that place in Pennsylvania. [Laughter]

And a special old friend, Dr. Dan Dreyfus, who for so many years directed not only the Energy Committee but the Members of the Energy Committee. He is now vice president of the Gas Research Institute. I know, as an aside, that Dr. Dreyfus has been interested in following our battles with nuclear waste, of which he was the godfather, of at least the so-called monitored retrievable storage, which is looking better all the time.

So, gentlemen, with that, welcome. Dr. Lichtblau, please begin.

Dr. LICHTBLAU. Thank you very much, Senator, for inviting me.

The CHAIRMAN. Excuse me. I did not ask my colleagues if they wanted to make an opening statement.

STATEMENT OF HON. CHIC HECHT, A U.S. SENATOR FROM THE STATE OF NEVADA

Senator Hecht. Yes, thank you, Mr. Chairman.

Just briefly I want to commend you for pursuing this course. As I have told you and your staff, this is a most important issue addressing this Committee and our Nation within this year, next year, and as Secretary Hodel said, if we do not do something about it we are going to have gas lines by the year 1990 again.

I would like to ask all of the people who are going to testify, we have heard prediction after prediction. I have heard if for the four years I have been in the Senate. Please try and give us some answers for what course we should be pursuing, not just what the economic consequences are going to be.

Thank you.

The CHAIRMAN. Thank you, Senator Hecht.

Senator Bingaman.

Senator Bingaman. I have a statement for the record, Mr. Chairman, and I am looking forward to the testimony.

[The prepared statement of Senator Bingaman follows:]

STATEMENT BY SENATOR JEFF BINGAMAN
WORLD OIL OUTLOOK HEARING
March 11, 1987

I want to thank Chairman Johnston for continuing this series of hearings on the crisis facing our domestic oil and gas industry. I strongly support his efforts to heighten public awareness of the serious threat facing the industry.

It is clear we must do a better job of educating the public and the Administration to the serious implications for the economic well-being and national security of the nation if the current crisis is allowed to continue. My view is that a strong, profitable domestic oil and gas industry is vital to this nation and to my own state of New Mexico.

This view was certainly reinforced in the oversight hearings this Committee held in New Mexico last week. Over 2,000 people attended these hearings to register their concern for the future existence of the industry. New Mexico is the fifth largest oil and gas producing state in the nation in total quantity and has suffered from the drop in oil and gas prices. Revenues generated by the industry showed a 25 percent decline in 1986. The total value of New Mexico's oil and gas activity has fallen 46 percent in the past year. Employment in the industry dropped from a low of 13,200 in 1985 to 9,000 in October 1986. The number of drilling rigs are down to an average of 29 compared with 71 last year. And of the state's bankruptcies, estimated at 2,500 for 1986, one fourth occurred in those counties where most of the state's oil and gas is produced. Clearly, effective action is needed to halt the decline of the industry.

Today's hearing will continue to focus attention on how international events and actions affect what happens in our domestic industry.

The important next step is to determine what an effective national energy strategy or policy should be -- a policy that is good for the entire country -- not just oil-producing states.

Regardless of the statements by the Administration, the strategic interests of our nation are clearly at risk if we do not act in the near future. I look forward to the testimony of today's distinguished witnesses, to their recommendations, and to future hearings.

The CHAIRMAN. Senator Wirth?

Senator WIRTH. I had a very, very long statement, Mr. Chairman, but as long as you have already started I will forgo now.

The CHAIRMAN. Thank you, gentlemen. Dr. Lichtblau.

STATEMENT OF DR. JOHN H. LICHTBLAU, PRESIDENT, PETROLEUM INDUSTRY RESEARCH FOUNDATION, INC.

Dr. LICHTBLAU. Thank you very much.

I do admit to being a numbers cruncher, but in the interest of time I would like to not reoffer all the numbers we have in here, but submit them in my testimony and just read an abbreviated version. Is that acceptable?

The CHAIRMAN. Yes. Without objection, the full statements of all witnesses will be entered in the record.

Dr. LICHTBLAU. Thank you, very much.

You asked a number of questions, Senator, in your letter and I would like to answer a few of these.

The first is: What is the outlook for foreign oil supplies?

To determine foreign oil supplies in the foreseeable future, say to the mid-1990s, we must start with a price assumption. Let us assume the current price level will be approximately maintained this year, and then rise about in line with inflation to the mid-1990s. This is probably a moderate price scenario if the OPEC system remains intact.

Under this scenario, we see non-OPEC production outside the U.S. rising by about 1.5 million barrels per day over the next few years, but starting to decline in the first half of the 1990s. Net Soviet and Chinese oil exports will decline from 1988, 1989, on, and by 1995 will be less than half of last year's volume, which was about 2 million barrels a day.

Thus, OPEC exports from about 1990 on must offset the decline in total non-OPEC supplies, and provide for entire growth of world oil demand. This is likely to be a high volume from the early 1990s on, particularly since under our assumed price scenario world demand can be expected to grow at about a million barrels a day in the first half of the 1990s.

However, physically or volumetrically OPEC should not have the slightest difficulty in meeting the required demand over the next ten years, at least. We know that OPEC's existing excess capacity amounts to at least 10 million barrels a day and will be substantially increased within a year following the end of the Iran/Iraq war.

There is also a vast potential to increasing use per capacity further particularly in the Middle East by low-cost drilling activities. Thus, the required increase in OPEC output from say 1987 and 1997 could be met under our relatively moderate price scenario without straining OPEC's productive facilities.

The question therefore is not whether these volumes can be supplied at those prices by OPEC, but whether they will be supplied, particularly during the latter part of that phase of that period.

The second question was: How important will Middle East oil be to the U.S. and its allies? There is a widely held assumption, and you mentioned it just now, that U.S. and European reliance on

Middle East oil will grow substantially in the foreseeable future. We think this is entirely correct. Most OPEC producers outside the Middle East will have rapidly shrinking spare capacity from the early 1990s on. Venezuela may be one exception.

Thus, the growth in OPEC exports during the 1990s must come primarily from the Middle East. Last year, the Middle East accounted for 64 percent of total OPEC production. By the mid-1990s, it will be somewhere between 68 and 70 percent. But by then, most of the world's excess producing capacity will be concentrated in the four major Middle East producing countries which will inevitably become the world's swing producers collectively or individually.

In 1985, as you know, Saudi Arabia rejected this role in a declining market because of the magnitude and duration of the decline. However, being the swing producers in a rising market is obviously a very different and far more attractive proposition.

Of course given that gigantic untapped reserve, the Middle East countries whose current proved reserves are equal to about 100 years of production compared to about 36 years for the other OPEC nations, should not want to see prices rise to the point of depressing world consumption once again and stimulating high cost oil and other energy production.

Thus, they can be expected to resist maximizing short-term price gains obtained at the risk of medium- to long-term market losses. How successful they will be in this depends to a significant extent on political and strategic factors that have little to do with the economics of oil.

Your third question: What are the prospects for continuing decline in domestic oil production, short term and long term?

The continuing decline in U.S. oil production is virtually inevitable under any realistic price scenario, but the future rate of decline is very much a function of world prices and possibly of U.S. Government policy. Last year, U.S. crude output dropped by over 700,000 barrels a day between the first and the fourth quarter of 1986. All of the decline occurred in the lower 48 States whose output dropped by 10 percent. The decline was primarily a result of the price collapse.

However, it is good to remember that a secular decline starting in the late 1980s had been widely expected and predicted, even if prices had moved up from the 1985 level instead of down. For instance, the Department of Energy in its 1985 High Price Case Forecast projected a decline in U.S. crude production from 9 million barrels per day in 1985 to 8.4 million barrels per day in 1990, and 7.4 in 1995.

The coming decline in Alaskan North Slope production is probably still approximately in line with the DOE's earlier projection. In the lower 48, however, the price collapse has greatly increased the size of the decline probably by several hundred thousand barrels per day.

The lower price will also cause of course an increase in demand in the U.S. By 1990, demand is likely to be 1.5 to 2 million barrels per day above last year's level of 15.7 million barrels per day. Thus, the U.S. import dependency will now grow substantially faster than had been expected prior to 1986 both because of the rapid decline in production and a rapid increase in consumption.

In 1985, net imports were equal to 27 percent of total U.S. demand, the lowest level since 1972. Last year, the ratio rose to 33 percent. By 1990, it is likely to be about 40 percent, and by the mid-1990s, even under a relatively modest price scenario, it could well exceed the historic peak of 47 percent attained in 1977.

Four——

The CHAIRMAN. Doctor, excuse me. Did you say how much domestic production we are likely to lose next year, or the year after?

Dr. LICHTBLAU. No, I said how much we lost this year. We might lose another 350,000 barrels per day—when you say "next year," do you mean 1987?

The CHAIRMAN. Yes.

Dr. LICHTBLAU. Approximately maybe 350,000 barrels per day this year, assuming that the price level approximately remains the same.

The CHAIRMAN. Would that trend continue throughout the rest of the decade?

Dr. LICHTBLAU. Again, it depends on prices. If you assume prices moving up at least in line with inflation, the reduction may be somewhat less in the 1989–1990 period; but we definitely will have, we lost as I say 700,000—of course the 700,000 barrels per day we lost in 1986 was from the beginning of the year to the end of the year, not average over the year. The annual decline in 1986 was substantially less. Again, I think 350,000 to 400,000 barrels per day. So on an annual basis, we probably will not lose much less in 1987 than we lost in 1986, because it will be evenly distributed over the year, while last year it increased, it accelerated throughout the year, and in 1988 there will be further decreases.

It is difficult to see under our price scenario the production will not decline every year from now on, unless you assume some substantial finds that are not in the cards right now.

What, if anything, should the U.S. do about our growing dependence on foreign oil? That is your next question.

Serious arguments and counterarguments can be and are made for a policy of doing nothing, as well as for one of substantial government intervention. One argument for the do-nothing case assumes that the world oil price reached bottom in 1986, and is now on a recovery path based on OPEC's new price-volume constraints which will be adhered to closely enough to raise prices above the $20 level during the course of 1988.

This would provide approximately the same incentive to domestic producers as did the $26 average lower 48 wellhead price of 1985 in view of substantial reductions in drilling and leasing costs since then. The argument assumes additional price increases in the post-1988 period at least in line with inflation.

Hence, under this scenario OPEC would come to the rescue of the domestic oil industry. Consequently, no governmental action would be required. This is an optimistic but not unrealistic scenario. In fact, many oil companies assume price increases on that order of magnitude in at least one of their main scenarios.

The counterargument is that relying on OPEC to push up oil prices sufficiently in the near future is a very risky proposition. Even OPEC's past record of inability to maintain effective interorganizational discipline and the group's substantial actual and potential surplus capacity which will overhang the market for a good many years, even if OPEC succeeds in forestalling another price collapse, the aforementioned risk factors are likely to maintain a high degree of price uncertainty in the minds of all producers for some time. They may therefore base their investment decisions on a flat or downward price trend, even if an upward trend is discernible.

The other argument for doing nothing is that most major industrializing countries have already a far higher degree of dependency on imported oil than the U.S. is likely to have even by the mid-1990s, yet these companies pay no more for their oil than we do and have as ready access to it. The only time they experience shortages was during the disruptions of 1973 and 1979 when we did too.

Thus, our international competitiveness would not be heard if our oil import dependency increased, while an adequate strategic petroleum reserve would probably protect us from the consequences of limited foreign supply disruptions.

The objections to this argument are of a geopolitical and economic nature. Geopolitically, since the U.S. is one of the world's two superpowers, it is argued that increased foreign dependency on such an essential commodity as oil must be viewed in the context of the current superpower struggle, keeping in mind that the other superpower is a net exporter of all fossil fuels.

Furthermore, since the incremental foreign supplies would have to come directly or indirectly from the Middle East, our political mobility in that complex and unstable region would undoubtedly become constrained if our oil requirements from it grew rapidly to the point of becoming irreplacible.

Significantly faster increases in oil imports than would be the case under a high price level does of course have a positive impact on the economy by keeping energy costs lower, but there are substantial negative effects such as the impact of the higher imports on the balance of trade, and even more so on the U.S. oil and gas production.

The question has been asked whether an essential basic domestic industry such as oil and gas production should be allowed to decline steadily, perhaps irrevocably, not because its resources have been depleted, but because they can be supplied below domestic replacement costs from abroad. It is certainly a legitimate question.

Another method to consider is the fact that by importing perhaps 2 to 3 million barrels per day more by the mid-1990s than we would do under a higher price, or some other kind of new domestic production incentive, we may put considerable additional upward pressure on world prices by then, possibly more than offsetting the import price advantage of the earlier years.

My final point is: If it is decided to take action, what can be done?

I have no answers to that one. There are two types of action the government can take to help domestic oil producers directly. One is to raise prices. The other is to reduce taxes. The first, which would probably be imposed through an import fee, would have an immediate positive effect on domestic producers' cash flow, but a negative effect on the economy at large by raising energy costs domestically and weakening our international competitive position.

It is also likely to trigger retaliatory action on the part of some oil exporters. An import fee would probably stimulate production from existing fields in the short run. However, it is less certain to stimulate additional exploitation, partly because of the political uncertainty of its duration, and partly because producers are free to invest the higher cash flow obtained from import fees outside the oil and gas producing industry.

Lowering the producing industry's tax burden would probably be a slower stimulant than a price increase, but would of course not raise energy costs. Initially, any such tax measure, if it is effective, would tend to reduce fiscal revenues, but over time it may well cause them to rise as a result of the additional drilling activity following additional production.

Perhaps a higher percentage depletion reduction or some other drilling tax incentive given to all producers for any new well may be an appropriate instrument to concentrate the stimulation where it would be most effective. The Government's primary role should be to protect against the impact of short-term foreign disruptions I think, which of course is a very different problem from the long-term dependency on foreign oil.

Therefore, a strong Strategic Petroleum Reserve aggressively developed to its programmed maximum level of 750 million barrels is a first line of defense. It provides a mechanism to augment supply and dampen price increases in the event of an emergency.

If no other funds are available, the cost of building up this reserve could be paid out of a fractional increase in motor fuel taxes.

The Government's second role is to remove existing impediments to exploration and production. A repeal of the outmoded windfall profits tax should head that list. It would be ironic if the economic incentive of a price increase to a level above $20 would immediately be partly offset by a tax originally imposed on the assumption that oil prices would never decline.

Finally, the Government's last decision should be whether to intervene directly. Even here, I think we should proceed cautiously. Small, targeted measures will provide the biggest benefit at the least cost. These might include the production tax incentives I have mentioned. Somewhere on the list, but definitely not near the top, should be consideration of a broad, blunt market interventions such as an import fee.

Thank you very much.

[The prepared statement of Dr. Lichtblau follows:]

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THE WORLD OIL OUTLOOK

Statement by

John H. Lichtblau
President

before the

United States Senate

Committee on

Energy and Natural Resources

March 11, 1987

Mr. Chairman

Thank you for inviting me to testify at your Committee's hearings on the World Oil Outlook.

In your letter you raised a number of questions on which the Committee would like to have comments. I would like to address myself to several of these in the following paragraphs.

1. What is the Outlook for Foreign Oil Supplies?

In answering this question it might be useful to break foreign supplies into 3 groups: OPEC, non-OPEC outside the U.S. and net exports from the Centrally Planned Economies (CPE's). As we know of course OPEC crude production peaked in 1979 at 30.9 million B/D, then declined steadily to 16.2 million B/D in 1985. During the same period foreign non-OPEC oil output rose by over 6 million B/D while net exports from the Soviet Bloc and China nearly doubled, to more than 2 million B/D. In 1986 OPEC production increased substantially, by nearly 2 million B/D, while foreign non-OPEC production remained almost flat due to commercial and governmental reactions to the price collapse. This year OPEC production should be well below last year's 18.1 million B/D but well above the 1985 volume. Foreign non-OPEC production will once again show a significant increase, partly because of a reversal of last year's commercially induced reduction in exports and partly because of rising new production. Net CPE exports are likely to remain flat, as they did in 1986.

To determine foreign supplies in the foreseeable future, say, to the mid-1990's, we must start with a price assumption.

Let us assume the current price level will be approximately maintained this year and then rise about in line with inflation to the mid-1990's. While this may be viewed as a realistic scenario, if the current OPEC price system approximately holds it is probably on the low-side.

Under this scenario we see non-OPEC production outside the U.S., which amounted to nearly 18 million B/D in 1986, rising by 1.5-2.0 million B/D over the next few years but starting to decline in the first half of the 1990's. The largest single factor in the decline will be the drop in North Sea production. Net Soviet and Chinese oil exports will decline from 1985-1989 on, and by 1995 may well be less than half of last year's nearly 2 million B/D. Thus, OPEC exports from about 1990 on must (1) offset the decline in foreign non-OPEC supplies, U.S. supplies (which will be discussed below) and net CPE exports and (2) provide for the entire growth in world oil demand.

Altogether, this is likely to be a big volume from the early 1990's on, particularly since under our assumed price scenario world demand can be expected to exhibit an annual growth rate of perhaps one million B/D during the first half of the 1990's, following a lower but still significant rate during the remainder of the 1980's. However, physically or volumetrically, OPEC should not have the slightest difficulty in meeting the required demand over the next 10 years at least. I don't want to go into all the calculations of OPEC reserve-to-production ratios and historical and current excess capacity in my brief testimony. But we know that existing excess capacity amounts to at least 10 million B/D and will be substantially increased within a year following the end of the Iran-Iraq war. There is a vast potential to increase producing capacity further, particularly in the Middle East, by low-cost drilling activities. Thus, the required increase in OPEC output between 1987 and 1997 could be met under our price scenario without straining OPEC's productive facilities. The question therefore is not whether these volumes can be supplied at those prices by OPEC but whether they will be supplied, particularly during the end phase of this period.

2. How Important will Middle East Oil be to the U.S. and its Allies?

There is a widely held assumption that U.S. and European reliance on Middle East oil will grow substantially in the foreseeable future. We think this is a correct assumption, given the well-known concentration of oil reserves in that part of the world. Under our price scenario, or even a somewhat higher one, most OPEC producers outside the Middle East will have rapidly shrinking spare capacity from the early 1990's on. Venezuela is a probable exception. Thus the growth in OPEC exports during the 1990's must come primarily from the Middle East. Last year the Middle East accounted for 64% of total OPEC crude production, compared to a 60% average for the period 1984-86. By 1995 it is likely to be more than two-thirds. By then most of the world's excess producing capacity will be concentrated in the four major Middle East producing countries, which will inevitably become the world's swing producers, collectively or individually. In 1985 Saudi Arabia rejected this role in a declining market because of the magnitude and duration of the decline. However, being the swing producer in a rising market is obviously a very different and far more attractive proposition.

In determining their price/volume policy in the 1990's Saudi Arabia and the other Middle East producers can be expected to consider also the interests of those OPEC members who by then can no longer raise their revenues through higher output but only through higher prices. Of course, given their gigantic untapped reserves, the Middle East countries whose current proved reserves are equal to nearly 100 years of production, compared to 36 years for all other OPEC members, should not want to see prices rise to the point of depressing world consumption once again and stimulating high cost oil and other energy production. Thus, they can be expected to resist maximizing short term price gains obtained at the risk of medium to long term market losses. How successful they will be in this depends to a significant extent on political and strategic factors that have little to do with the economics of oil. In other words, the very low cost and superabundance of Middle East oil may not be the principal future determinants in setting its price, just as they were not its historical determinants. Rather, the price will be determined by the region's position as the world's marginal supplier.

3. What are the Prospects for Continuing Decline in Domestic Oil Production over the Short Term and over the Long Term?

The continuing decline in U.S. oil production is virtually inevitable under any realistic price scenario. But the future rate of the decline is very much a function of world oil prices and U.S. government policy. Last year U.S. crude output dropped by over 700,000 B/D between the 1st and the 4th quarter. All of the decline occurred in the lower-48 states whose output dropped by 10%. The decline was primarily a result of the price collapse. However, it is good to remember that a secular decline starting in the late 1980's had been widely expected and predicted even if prices had moved up from the 1985 level instead of down. For instance, the Department of Energy in its 1985 High Price Case Forecast projected a decline in U.S. crude production from 9.0 million B/D in 1985 to 8.4 million B/D in 1990 and 7.4 million B/D in 1995, assuming a price increase in real dollars from $27 in 1986 to $37 in 1995. The difference between the expected and actual decline is illustrated by the fact that the DOE's projection for 1990 was reached in the 4th quarter of 1986. (However, a significant part of this decline may reflect postponed drilling rather than a permanent loss of reserves). The coming decline in Alaskan North Slope production is probably still in line with the DOE's earlier projection. In the lower-48, however, the price collapse has speeded up the size of the decline probably by several hundred thousand B/D.

The lower prices will also cause an increase in demand. The DOE's 1985 Base Case Forecast shows demand rising from 15.7 million B/D in 1985 to 16.1 million B/D in 1990 and 16.5 million B/D in 1995. Under the much lower actual prices the DOE's 1990 demand level was reached in 1986 and under currently projected prices, the 1995 level could well be reached by 1990.

Thus under the new price scenario U.S. import dependency will now grow substantially faster than had been expected prior to 1986, both because of a more rapid decline in production and a more rapid increase in consumption. In 1985 net imports were equal to 27% of total U.S. demand, the lowest level since 1972. Last year the ratio rose to 33%, by 1990 it is likely to be about 40% and by the mid-1990's it could well exceed the historic peak of 47% attained in 1977.

4. What if Anything should the U.S. do about our Growing Dependence on Foreign Oil?

Serious arguments and counter arguments can be, and are, made for a policy of doing nothing as well as for one of substantial government intervention.

The arguments for the do-nothing case are twofold. The first assumes that the world oil price reached bottom in 1986 and is now on a recovery path based on OPEC's new price/volume constraints which will be adhered to closely enough to raise prices above the $20 level during the course of 1988. This would provide approximately the same incentive to domestic producers as did the $28 average, lower-48, wellhead price of 1985, in view of the substantial reduction in drilling and leasing costs since then. The argument assumes additional price increases in the post-1988 period at least in line with inflation. Hence, under this scenario, OPEC would come to the rescue of the domestic oil industry. Consequently no governmental action would be required.

This is an optimistic but not unrealistic scenario. In fact, many oil companies assume price increases on that order of magnitude in at least one of their main scenarios. The counter argument is that relying on OPEC to push up oil prices sufficiently in the near future is a very risky proposition.

given OPEC's past record of inability to maintain effective intra-organizational discipline and the group's substantial actual and potential surplus capacity which will overhang the market for a good many years. Even if OPEC succeeds in forestalling another price collapse, the aforementioned risk factors are likely to maintain a high degree of price uncertainty (which is very different from price volatility) in the minds of oil producers for sometime. They may therefore base their investment decisions on a flat or downward price trend even if an upward trend is discernible.

The other argument for doing nothing is that except for the U.K., Canada and Australia, most major industrial and industrializing countries have already a far higher degree of dependency on imported oil than the U.S. is likely to have even by the mid-1990's. Yet, these countries pay no more for their oil than we do and have as ready access to it. The only time they experienced shortages was during the disruptions of 1973 and 1979 when we did, too. Thus, our international competitiveness would not be hurt if our oil import dependency increased, while an adequate Strategic Petroleum Reserve could probably protect us from the consequences of limited foreign supply disruptions.

Again, this argument for doing nothing must be taken seriously but so must the objections to it. These are of a geopolitical and economic nature. Geopolitically, since the U.S. is one of the world's two super powers, it is argued that increased foreign dependency on such an essential commodity as oil must be viewed in the context of the current super power struggle, keeping in mind that the other super power is a net exporter of all fossil fuels. Furthermore, since the incremental foreign supplies would have to come, directly or indirectly, from the Middle East, our political mobility in that complex and unstable region could undoubtedly become constrained if our oil requirements from it grew rapidly to the point of becoming irreplaceable.

A significantly faster increase in oil imports than would be the case under a higher price level does of course have a positive impact on the economy by keeping energy costs lower. But there are also substantial negative effects such as the impact of the higher imports on the balance of trade and, even more importantly, on U.S. oil and gas production. The question has been asked whether an essential, basic domestic industry, such as oil and gas production, should be allowed to decline steadily, possibly irrevocably, not because its resources have been depleted but because they can be supplied below domestic replacement cost from abroad. It is certainly a legitimate question. Another matter to consider is the fact that by importing perhaps 2-3 million B/D more by the mid-1990's than we would under a higher price or other kind of new production incentive, we may put considerable additional upward pressure on world prices by then, possibly more than offsetting the import price advantage of the earlier years.

8. If it is Decided to Take Action, What can be Done?

There are two types of action the government can take to help domestic oil producers directly. One is to raise prices, the other is to reduce taxes. The first, which would probably be imposed through an import fee, would have an immediate positive effect on domestic producers' cash flow, but a negative effect on the economy at large by raising energy costs domestically and weakening our international competitive position. It is also likely to trigger retaliatory action on the part of some oil exporters, including such non-OPEC countries as the U.K. and Canada. An import fee would probably stimulate production from existing fields in the short run. However, it is less certain to stimulate additional exploration, partly because of the political uncertainty of its duration and partly because producers are free to invest the higher cash flow obtained from the import fee outside the oil and gas producing industry. Some would undoubtedly do so.

Lowering the producing industry's tax burden would probably be a slower stimulant than a price increase but would of course not raise energy costs. Initially, any such tax measure, if it is effective, would tend to reduce fiscal revenues. But over time it may well cause them to rise as a result of the additional drilling activity, followed by additional production. Perhaps a higher percentage depletion deduction or some other drilling tax incentive given to all producers of any new well may be an appropriate instrument to concentrate this stimulation where it would be most effective.

I have tried to point up some of the arguments and counter arguments for taking or not taking action to stimulate domestic oil production. The uncertainty confounding the oil and gas industry will inevitably lead to further shrinkage of the drilling and producing side of the business. It is clear that this is a problem of major proportions for the producing regions of the country. Whether it is also a problem for the entire nation and the national security is less clear. The U.S. government can protect against over- or under-reaction by looking at its role in three steps.

The government's role, in the first instance, should be to protect against the impact of short-term foreign disruption, a very different problem from long-term dependency on foreign oil. A strong SPR, aggressively developed to its programmed maximum level of 750 million bbls, is the first line of defense. It provides a mechanism to augment supply and dampen price increases in the event of an emergency. If no other funds are available, the cost of building up this reserve could be paid out of a fractional increase in motor fuel taxes.

The government's second role is to stay out of the industry's way. Thus, removal of impediments to exploration and production should receive first priority, and repeal of the outmoded "Windfall Profits" Tax should head the list. It would be ironic if the economic incentive of a price increase to a level above $20 would immediately be partly offset by a tax originally imposed on the assumption that oil prices would never decline.

The government's last decision should be whether to intervene, and even here, it should proceed cautiously. Small targeted measures will provide the biggest benefit at the least cost. These might include the production tax incentives such as I have mentioned. Somewhere on the list, but definitely not near the top, should be consideration of the broad, blunt market interventions such as import fees.

The CHAIRMAN. Thank you very much, Dr. Lichtblau.
Dr. Jones.

STATEMENT OF DR. SCOTT T. JONES, VICE PRESIDENT, ENERGY, METALS AND MATERIALS, CHASE ECONOMETRICS, INC.

Dr. JONES. Thank you, Senator, for inviting me here today to offer you our view on the oil outlook to the 1990s.

First of all, let me begin by saying that our analysis suggests that the United States will import something on the order of 4.8 million barrels of crude oil this year, but you have to add to that another approaching 2 million barrels a day refined product that we import. But if we restrict the discussion just to crude oil, that is some 1.8 million barrels per day more than we imported into this country in 1985, and that oil will be coming into this country with an average price of at least $2 a barrel higher than imports last year, but substantially lower than the prices in 1985.

By 1990, we anticipate that the decline in U.S. oil production capability will be at least 1.5 million barrels per day to a level of about 7.5 million barrels per day. Again, we are talking about crude oil.

If prices are lower than we anticipate, which means that if prices are lower than the $17, $18, $19, $20 a barrel range over that period, that decline could be substantially greater than 1.5 million barrels per day, something on the order of 2 to 2.5 million barrels per day.

What that suggests is that by 1990 the U.S. will be dependent upon foreign crude oil for a significant portion of its annual consumption, even with prices in the range that Dr. Lichtblau discussed, and we concur.

The real risk we see to the domestic oil industry comes in the late 1980s and 1990s, if we do not have prices substantially above the mid-teens. Our analysis of oil production capability in this country suggests that the decline in oil production is not linear. The fact that it went down 300,000 to 400,000 barrels a day last year, and will approximately match that this year, does not mean that you can make the leap of faith and suggest that it will go down 300,000 to 400,000 barrels per day in 1990.

Indeed, our analysis of U.S. reservoirs and production capabilities suggest that the decline tends to be nonlinear, strongly nonlinear two to three years from now, so that the rate of decline will tend to accelerate if prices are not increased in the near-term.

We expect that much of the increase, as you pointed out, much of the increases in imported crude oil will come from OPEC sellers, and a growing portion of that oil will be Middle Eastern OPEC sellers as we move to the 1990s.

Additions to U.S. proved reserves of oil and natural gas will continue to fall short of annual rates of production as oil and gas exploration activity remains near 1986 levels in 1987, and again in 1988. The longer term outlook for that particular industry—that is, the industry that supports oil and gas exploration and oil and gas service industries—is particularly grim, despite the fact that the costs of drilling an oil well has fallen precipitously throughout 1986 and continues to sink in 1987.

In order to approximate what it would take to return to 1985 levels of drilling activity in this country, we did a number of simulations based on our analysis of the industry, and it showed us that the price of oil would have to rapidly return—that is within the next three years—rapidly return to a price in the neighborhood of $45 to $50 a barrel in order to get drilling activity back up to 2000 rigs on an average annual basis.

Now that is not an expected price increase, but it does give you an idea of the order of magnitude of the damage that has been done to the expectations about potential investment in wildcatting for oil and gas in this country. All this suggests that America's oil production capability is aging rapidly. I use the term "aging 'in that very regard.

We have also analyzed the way the oil fields in this country are composed. They are increasingly composed of older wells, and they are increasingly composed of wells that are being categorized as strippers. This will continue. So that we are getting an aging phenomena on the oil patch in this country which is reflected in lower output levels.

As time passes, the U.S. will indeed lose its capability to participate in a response to an oil crisis, where "participation" is defined as the capability to respond with meaningful supplies of oil and other liquids to combat a shortage created somewhere else in the world. This reduced capability of course, as I indicated, is manifesting itself today in our declining production and output levels, but it also means that when an oil crisis does occur it will equate rapidly into much higher prices.

We have done a significant amount of research in that area, and our research suggests that oil prices could easily be above $30 a barrel for a relatively short period of time with a crisis as early as two years hence. That is, the ability for the oil and gas industries around the world to respond to much higher prices is there, but it takes time, and the amount of erosion and the efforts to conserve oil and to replace energy consuming facilities, particularly in the industrial sector, with more efficient facilities has gone away in the last two years, so that we remain increasingly vulnerable in this country and elsewhere to much higher prices in the relatively near future.

As little as three years ago, of course, many of the trends that we see today toward using less efficient industrial facilities and people driving further, and so on and so forth, were not in place. Indeed, in the last two years we have reversed a five-year trend toward less oil use and are strongly on a path to more oil use.

Now part of the questions that you submitted to me that I should address this morning involved what should we do, basically. Well, as John pointed out, we could do nothing and be subject to the perils and whims of the commoditization of oil, the fact that oil is increasingly a commodity in terms of its characteristics.

What that presents to the oil industry, the suppliers of oil, in this particular country is an increasingly risky picture. The response has been, as we have seen in the exploration and production end of the business, not to invest in that, and rather to use financial resources elsewhere.

Now part of that is due to pressure from the financial community itself, looking very hard at oil industry bottom lines, and as a result pressuring the industry to be careful about every expenditure they make. But that is the world of the commodity. It is a world in which producers have no control, and it is a world in which OPEC finds itself very uncomfortable. Hence, the recent efforts on the part of OPEC to try to reestablish a degree of monopoly power, at least with regard to control of the cartel's oil supplies.

It strikes us that Congress has a number of choices, obviously. Either somehow increase supply, or somehow reduce demand, or a little bit of both. I do not intend to rehash the oil import fee issue because I think enough testimony and study has been done on that, but let me do talk about one related set of issues. That is, the issue of some sort of financial or fiscal incentive for the oil and gas industry, that portion of the oil and gas industry that does a good job on replacing reserves. After all, that is what we are here in hopes of doing—that is, providing the United States with a buffer in the form of liquid hydrocarbons to be used in the future.

Incentives could be designed, for example, to reward oil companies who do a good job at replacing reserves—and that is not every oil company in the United States by any stretch of the imagination. Those companies could be rewarded with an incentive on the order of accelerated depreciation rates, incentives that would allow them some sort of fiscal response.

Alternatively, Congress could turn to North America's very large natural gas reserves, and I am sure Mr. Dreyfus will have a lot to say about this, but America is awash as it were in natural gas, not at $1.35 an mcf, but at prices higher than that. But that is one source of hydrocarbons that could, if the incentives were in place to put the delivery mechanism into the industrial sector, particularly on the front tiers of America's transmission facilities, we could become increasingly reliant at least on a resource that is outside the control of the Middle East, if supply security is indeed an issue.

Thank you, very much.

[The prepared statement of Dr. Jones follows:]

Statement of Scott T. Jones, Ph.D.
Vice President, Energy, Metals and Materials
Chase Econometrics, Inc.

Before the Committee on Energy and Natural Resources
United States Senate
For an Oversight Hearing on the World Oil Outlook

March 11, 1987

OPEC has embarked on its most risky venture since the Saudis launched netback pricing in the Fall of 1985. This latest Saudi-led attempt to defend the December crude oil price target has at least even odds of failure. At risk is the short-term stability of global crude markets. Longer-term, the Saudis seem prepared to lose a considerable degree of control to other members of the cartel, notably Iran.

The Oil Market Outlook

Each year, the March-April period begins the spring "pause" in refiner activity that can reduce free world oil demand by as much as 2.0 to 2.5 MMBD during the second quarter of the year. Normally, OPEC rides out this period of seasonal softness, along with other oil producers, who are content to catch up on other activities. For example, many oil companies launch well work-over programs during the Spring that last into June. During this period, refiners are in no rush to "gear-up" in order to meet the driving season's demand for gasoline.

Why has the cartel chosen the least robust period for crude demand to try and defend an oil price that is consistent with wintertime peaks for oil and refined product? This is clearly a high-risk adventure, and it is requiring some tremendous discipline on the part of the cartel.

- Current Saudi output is well below the December quota, probably nearer to 2.1 MMBD than the 4.1 MMBD set at the meeting.
- All other members of the cartel appear to be at or below their production quotas (except Iraq). Yet, critics argue that the reduced levels of production are still too high given the prices they want for the crude.
- Early indications support a stand-off between sellers asking a premium price and buyers refusing to lift significant quantities of oil. Some producers, such as Qatar, apparently have not sold meaningful volumes of crude in weeks. Across the Middle East, oil storage is growing rapidly.

The Very Short-Term Outlook for Crude Oil Markets

Can OPEC do it? Our analysis suggests that they have no better than even odds. Here's why.

1. Since prices started to rise from $16/Bbl in early March, much of the global activity in crude markets has been in "paper barrels." Speculators reacted quickly to OPEC's latest effort to hold-the-line on crude prices. So far, purchasers of "wet barrels," those for actual use in refineries, have been few and far between. Callous observers note that it is no wonder that OPEC production is down, since they have priced themselves out of the marketplace.

2. Seasonal demand for gasoline runs will not start to improve the demand outlook for at least another six to eight weeks (see Table 1). Furthermore, Spring apparently is coming early to the U.S., as well as parts of Europe, causing heating oil demand to deteriorate smartly. That should leave refiners selling out of product inventories and refinery runs well below January/February levels.

3. The latest inventory statistics in the U.S. show levels well in excess of 1986 marks for most categories of refined product. That suggests crude oil buyers for refineries are going to be in no hurry to make large, long-term commitments to take OPEC oil at prices near $18/Bbl.

4. For many members of the cartel selling lower volumes at higher prices is an increasingly unattractive financial proposition. Total oil sales revenues may not increase sufficiently due to a growing reluctance on the part of buyers. Furthermore, many producers will have the added burden of increased reliance on oil storage. Examples are Kuwait, Saudi Arabia, Qatar, Libya, etc.

Having said all this, it is also possible that OPEC may make this strategic move work, leaving prices near $18/Bbl throughout March and April. The following factors appear to be in their favor.

1. OPEC action, rather than non-action, during the traditional seasonal slump in crude oil markets is something new. Heretofore, OPEC has tended to change directions in the Fall. During those months, the cartel has several months of sustained oil demand ahead that it can count on to cover up its mistakes. Recent examples of strategy changes are: this December's accord and the introduction of netback pricing the year before.

   The cartel has clearly surprised everyone, including the traders that hold the bulk of today's excess inventories in both crude oil and refined oil products. If the charade lasts long enough, the cartel may prevent a wholesale sell-off of non-OPEC oil inventories and a price collapse.

2. Every cartel member appears convinced that his livelihood depends on the success of his activity. That is accurate. We estimate that once embarked on this highly risky venture, there was no turning back. By cutting production and sticking to higher oil prices, a return to a $16-17/Bbl middle ground for Spring oil prices will be very difficult. The shift that has already occurred in oil sales and expectations about inventory balances suggests that prices in March and April will average either $18/Bbl or $13/Bbl. A loss of faith now would be very expensive for all concerned.

3. Largely predicated on an assessment of the risk associated with OPEC's adventure, non-OPEC producers appear to be supporting the attempt, at least to the extent of changing oil prices. Most major oil companies quickly raised postings to the $17 to $17.50/Bbl range for crude. That is quite near to the recent closing price for WTI and Brent landed in the U.S. Gulf.

4. While gasoline and other refined products markets are softening in Europe and the U.S., they have not exhibited an increased propensity to decline (so far) this year. U.S. demand for gasoline is comparable to 1986 levels, while distillate, jet fuel and residual fuel are slightly improved. In Europe, only gasoil sales are disappointing as refiners adjust to the end of an unusually harsh January weather pattern.

5. A recent earthquake in Ecuador has disrupted crude flows, at least temporarily. Local officials estimate that production will be interrupted for at least one month.

Our short-term oil price outlook is best developed in the context of scenarios, each dependent on a view about the success of OPEC's latest attempts to stabilize prices near $18/Bbl. Each of those scenarios is presented as a monthly or quarterly oil price projection shown through the end of the year. Furthermore, in order to compare the two new scenarios ("OPEC Holds the Line" and "OPEC Collapses") to the latest base case, "The February Oil Market Outlook."

Scenario One: The February Oil Market Outlook

Frankly, the analysis prepared less than a month ago contains a highly probably explanation for future OPEC behavior, particularly beyond the March/April hiatus. Elements of this scenario will undoubtedly underlie oil price movements in 1987. The characteristic that crude markets will see substantially more OPEC crude this summer, irrespective of the $18/Bbl target price, still seems very persuasive.

Our analysis suggests that the market's behavior in February is likely to have set the stage for the implementation of a new OPEC strategy for the last half of 1987. That new strategy will be designed to accommodate the propensity of crude oil traders to increase sales at the slightest hint of cartel weakness.

OPEC producers and non-OPEC oil traders alike will increase oil sales gradually as demand improves later this spring (see **Table 1**). Before then, however, OPEC will fashion another show of resolve. That will allow them to stumble through the market's seasonal softness without losing a lot more than $2-$3/Bbl off January highs. That near-term price outlook appears as **Table 2**.

May or possibly June, all bets are off and Saudi production is expected to increase. Hence, the relatively modest summertime oil price forecast shown in Table 2. Crude oil prices are expected to fluctuate from $16 to $17/Bbl for several months as OPEC injects nearly 17.0 MMBD of crude into a strengthening products market.

Increased sales of OPEC crude are expected to persist throughout the summer months. In fact, average sales approaching 18.00 MMBD for late Summer could cause nominal oil price *softening* just before refiners switch to runs of heating oil.

This Fall, OPEC is expected to re-play its seasonal pageant "to re-gain control" of the market. Meetings, brow-beating and speeches of unity are expected to be successful in raising oil prices late in 1987, simply because of higher oil demand in the OECD. Hence, $20/Bbl for the month of December does not seem entirely out of reach.

In addition, here is our list of major risks to this market outlook, listed chronologically for 1987.

- Inventories - No one knows for sure how much extra oil is tucked away in the form of refined product, or even crude. The amount appears to be considerable, however, if the latest inventory numbers from the U.S. and Europe are anywhere near correct. For example, despite the bitter cold Europe suffered in January, oil product inventories actually increased! Did the much needed increase in heating oil come out of secondary and tertiary storage? Could be, and if it did, that means refiners simply added to an already noticeable burden in free-world refined product supplies on-hand since late 1986.

- Maybe the anti-OPEC pundits are right? If the cartel has been significantly exceeding its December quota consistently since January 1, 1987, then oil prices could easily fall to $15/Bbl within 60 days. That much extra crude would set OPEC's IQ87 oil production at 16.8 MMBD, fully 0.6 MMBD above what we have in Table 1. We will know soon enough. That much extra crude production will be virtually impossible to hide in today's sodden oil market.

- Saudi Arabia's ARAMCO deal could backfire. If liftings fall well short of projections and delays in "takes" persist beyond the schedule published in late January and early February, all confidence in the cartel's Persian Gulf stronghold could evaporate overnight. This could trigger massive trader-held oil and product sales, causing prices to plummet.

- Soviet oil exports to the West could grow, equalling or exceeding 1986 record levels. Compared to Table 1 estimates, that would add at least 200,000 B/D to free world supplies. Of course, the impact on oil prices would depend largely on the *timing* of any increase in Soviet exports, but the third and fourth quarters are the most likely periods for added flows of crude or product to the West. Since those are also periods of increased oil use, the "bottom-line" impact could be offset by a voluntary cut in Saudi production or an unexpectedly large reduction in weakening Chinese oil exports. We expect that CPE export behavior will do little to weaken oil markets in 1987. However, timing is crucial. One extra Soviet cargo at the wrong time and it could be the straw that breaks the camel's back.

Scenario Two: OPEC Holds the Line

Before March and April are over, maintaining the cartel's oil price targets will mean reducing oil production to the levels shown in **Table 3**.

The ten-country target shown in **Table 3** must prevail over the next two to three months in order for oil prices to stay near $18/Bbl. Furthermore, the following must also occur.

1. The Soviets must not increase exports dramatically following the thaw in Siberia. Usually, the Soviets devote some time to well maintenance in the Spring.
2. Non-OPEC producers, like Mexico, Norway, et al., must continue to cooperate with OPEC's objectives to establish a higher "benchmark" price for crude.

Should it all work, the 1987 oil price outlook could change markedly, particularly in the first half of the year.

Even in this higher oil price scenario, our analysis suggests that the strengthening summertime market for gasoline and other refined product will be used as an excuse by OPEC to increase sales volumes. By that time, many of the cartel's Middle East members will have accumulated considerable stores of crude. Furthermore, the "lesser" members of the cartel can improve their financial position smartly by raising production targets faster than prices can soften. Yet this rosy scenario still means that

(a) The Saudis must keep oil production in the 2.5-3.5 MMBD range during 1987 and, possibly, much of 1988.

(b) Iraqi output cannot swell much above 2.0 MMBD in 1987 or 1988. That target could easily be exceeded if all the planned expansions to their export capacity are added, and they do not re-join the cartel under a quota system.

Scenario Three: OPEC Collapses

Today's cartel strategy, if it fails in the next two or three weeks, could significantly weaken the fiber of OPEC. At the very least, Saudi credibility will be badly damaged and Iran's role strengthened. In the meantime, an oil price collapse will rock the marketplace, leaving scars on all concerned.

In the event that the current situation unravels, the following events are likely to take place.

- It would be in the Saudis' financial interest to fill its considerable "surge production" capacity and increase output considerably. After all, as a swing producer with output restricted to 2.5 MMBD, even $18/Bbl does not produce revenues that match those earned only last month when prices and output were $16/Bbl and 3.8 MMBD, respectively.

- Iraq and the USSR, as affected large-scale producers, are likely to follow suit as soon as possible. Their combined output could rise 0.3-0.7 MMBD in a few months.

If total OPEC production increases within 30 days to 18.0 MMBD, then the outlook for oil prices appears as shown in **Table 5**.

Besides OPEC, a big loser in this situation is the oil and gas exploration industry. Our drilling studies show that this price path would mean 1986's depressed levels of activity would be tested in the U.S. and in Europe. The damage to expectations about the financial worthiness of this industry could send several of today's damaged drilling and drilling supply companies scurrying for protection under Chapter 13.

The Next Few Years: 1987-90 Using Three Scenarios

Depending on the success of today's OPEC adventure, oil markets could be changed for good. If the Saudis resolve to limit the oil price floor to $18/Bbl appears unshakeable, then the industry worldwide will have what an import fee could have done in this country: reduced price risk associated with selling a commodity.

That risk really boils down to the effect of price volatility. Since oil and gas exploration requires considerable capital investment long before the first barrel is sold, today's volatile market has discouraged activity worldwide. Further, the emergence of futures markets, added oil storage, additional producers, etc., has over the last 20 years changed crude oil to a commodity whose price was increasingly beyond OPEC's grasp.

Hence, the three longer-term price scenarios shown in **Table 6** and **Figure 1** are really pictures of different worlds.

1. "The February Outlook" is a world of gradual evolution toward increasing OPEC control, as oil disappears from non-OPEC fields.

2. "OPEC Holds the Line" is a return to the increased monopoly power, with the cartel dictating price and adjusting production to seasonal changes in demand.

3. "OPEC Collapses" is one of the last steps toward full commodity status for oil markets. This would prove that the cartel can only influence price trends in the short-run when seasonal factors favor manipulation. Otherwise, the cartel's membership would just be one of several producer-groups supplying the marketplace. *Caveat*: At low prices, the non-Persian Gulf producers' fields go into rapid decline in the late 1980s. Hence, an oil "price shock" and at least a temporary return to higher prices becomes a real possibility, especially longer-term. Low prices to 1990 suggests high prices some time thereafter.

According to **Table 6**, today's OPEC actions to set the price of crude oil at $18/Bbl may not produce a substantially different outcome from that proposed in February. Certainly the February Oil Market Outlook scenario is positioned much nearer to the high-priced alternative than the OPEC collapse case. The reason: softening oil demand, particularly in the OECD, would limit the movement to much higher prices in the "OPEC Holds the Line" alternative.

1. The February outlook presumed free world oil demand would grow 1%, versus 1986 levels. That is an optimistic base case when compared to 0.5-0.7%, if prices creep toward the $20-22/Bbl range by the late 1980s.

2. The (proportionately) rapid increase in oil prices in the OPEC Collapse scenario, shown 1989-90, is due to the impact of much higher oil use, spurred by the low oil prices shown in **Figure 1**.

While the *total* revenue opportunities for OPEC are not dramatically different from one scenario to the next, by 1990 the *dependency* of the free world on OPEC-produced oil has increased dramatically if OPEC collapses (see **Table 7**. For example, if a projected 2.0-3.0 MMBD of refined product imports is added to the forecast volume of U.S. crude oil imports (the OPEC collapse scenario), over 55% of the estimated 17.5 MMBD total U.S. oil and product demand would come from foreign suppliers (see **Table 8**).

The U.S. Drilling Industry: The Outlook for the Lower-48

The low rates of drilling in 1986 are history. Even though oil prices recovered to their 1986 levels, the small number of new wells drilled will affect production over the next decade. Our analysts have examined the outlook for drilling activity, given the industry's performance in 1986, and the expectations for industry performance to 1989. This analysis was conducted using various scenarios for crude oil prices, alternative rates of return on financial instruments and changes in drilling industry expectations.

Reference Scenario

The parameters for the reference scenario come directly from the most recent Chase Econometrics energy forecast. This forecast projected that the number of new oil wells drilled over the next two or three years will remain well below the levels drilled in 1985 (see **Figure 2**).

The dramatic changes in drilling and oil prices have had and will continue to have a major impact on the standing-stock of oil wells. Because of the relatively high rates of new stripper wells and low rates of drilling, the number of nonstripper wells dropped over 6% between 1985 and 1986 (see **Figure 3**). This decline is expected to continue in 1987, but slows a little in 1988. In three years, the number of nonstripper wells is expected to decline by about 15%.

On the other hand, given relatively low oil prices and an aging oil patch the standing stock of stripper wells should grow throughout the forecast period (see **Figure 4**). By 1988, the number of stripper wells is predicted to increase about 9%. The rate of increase is relatively insensitive to either oil prices or New Wells drilled.

The rising number of stripper wells reflects the countervailing effects of increasing numbers of new stripper wells and a dramatic increase in the number of stripper wells abandoned. The increased number of new stripper wells can be traced to the burst of drilling activity in the early 1980s. Production from these wells is declining rapidly as these wells age and low prices lengthen maintenance rotations.

Stripper Well Abandonments

On the other hand, the number of stripper wells abandoned increased dramatically in 1986 and is expected to remain near that level through 1988 (see **Figure 5**). During the forecast period, the number of wells shut-in is expected to average almost 30% above the 1985 level. This effect is due to the increased number of stripper wells that results from a low oil price environment and higher production threshold at which the costs of operation and maintenance exceeds the value of the oil produced.

More stripper wells means that more oil will flow from stripper wells. But *incremental* production from nonstripper wells will fall slightly faster than the average change in the number of nonstripper wells because the output per nonstripper well falls slowly.

Production from Nonstripper Wells

The decreasing production per nonstripper well represents the effects of an increase in the average age of nonstripper wells and a decrease in the size of new oil field discoveries. As the number of new oil wells falls below the number of new stripper wells, the average age of nonstripper wells increases. Consistent with the production-decline curve, this tends to decrease the average rate of production. Compounding this decline is the reduction in the number of class A, B, & C oil fields found in the late 1970s.[1] Again, as oil is pumped from the smaller fields discovered during this period, average production per well declines (see **Figure 6**).

The decline in production from nonstripper wells more than offsets the increased production from stripper wells. Consequently, oil production in the lower 48 states is forecast to decline throughout the forecast period (see **Figure 7**). By 1988, production is expected to decline by more than 11% compared to 1985 levels.

Alternative Oil Price Scenarios: The Impact on Drilling Activity

Oil prices can be either higher or lower than levels forecast in the reference scenario. To evaluate a range of uncertainty associated with future levels of oil prices and drilling activity, we examined two alternative scenarios.

The two scenarios simulate alternatives to current OPEC behavior. At one extreme, OPEC's attempt to set new production quotas could collapse. This failure could precipitate another production free-for-all, in which oil prices collapse. At the other extreme, OPEC could stick to the new production quotas, thereby raising the price of oil. These alternatives are shown in **Table 8**.

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[1] Field size classifications based on the American Association of Petroleum Geology. Class A fields contain over 50 million barrels, B fields contain 25-50 million barrels and class C fields contain 10-25 million barrels. The ten year lag was chosen because several analysts have found that on average, there is a ten-year lag between the discovery and production of crude oil in the lower-48 states. This does not mean it takes ten years to produce oil from a new field. Rather, on average, ten years elapse between the discovery of a new oil field and production of 50% of the oil contained therein. Finally, the number of large fields discovered ten years earlier has a positive effect on the average production by a nonstripper well.

The three-year outlook for oil prices, new oil wells, and stripper well abandonment associated with these alternative scenarios are shown in **Table 9**. The rate of drilling new oil wells follows these alternative price paths. If the price oil collapses, so too would drilling activity. On the other hand, even a significant increase in oil prices would raise drilling activity to well below the 1985 experience.

Our analysts simulated the oil price required to match the 1985 level of drilling activity. The simulation escalated oil prices annually until the negative expectational elements created by the market collapse in 1986 were reversed. That simulation is shown in **Table 10**. A *tripling* of real oil prices by 1989 is needed before the annual average rotary rig count approaches 1985 levels of activity.

TABLE 1
BASE CASE OUTLOOK
FREE WORLD SUPPLY/DEMAND OIL BALANCE
(MMBD)

	1985	- - - - - 1986 - - - - -				- - - - - 1987 - - - - -			
		1ST HALF	IIIQ	IVQ	YEAR	IQ	IIQ	2ND HALF	YEAR
TOTAL DEMAND	45.5	46.5	46.2	47.4	46.7	48.0	46.0	47.3	47.2
OECD	34.0	34.8	34.5	35.6	34.9	36.1	34.2	35.4	35.3
OTHER	11.5	11.7	11.7	11.8	11.8	11.9	11.8	11.9	11.9
SUPPLY									
OPEC CRUDE	16.0	18.0	19.2	17.1	18.1	15.8	16.6	18.0	17.1
NON-OPEC CRUDE*	24.2	23.9	24.0	24.0	23.9	23.8	23.6	23.6	23.6
NGLs	3.7	3.8	3.9	4.0	3.9	4.0	3.9	4.0	4.0
OPEC NGLs	1.3	1.2	1.4	1.4	1.3	1.3	1.4	1.4	1.4
CPE EXPORTS	1.6	1.9	2.5	2.0	2.1	1.5	1.9	2.0	1.9
TOTAL SUPPLY	45.5	47.8	49.8	46.9	48.0	45.1	46.0	47.6	46.6
INVENTORY/SURPLUS**	0.0	1.3	3.7	(0.5)	1.3	(2.9)	0.0	0.3	(0.6)

* INCLUDES PROCESSING GAIN AND NONCONVENTIONAL FUELS.

** INCLUDES OIL AND PRODUCT RE-IMPORTED TO THE SOVIET UNION THROUGH BARTER TRADE WITH VARIOUS PRODUCERS.

TABLE 2
THE SHORT-TERM, SPOT OIL PRICE OUTLOOK
(FEBRUARY, 1987)
WITH CONTINUED, MODEST COOPERATION IN OPEC
($/BBL, W.T.I.)

1986	
DECEMBER	16.53
1987	
JANUARY	18.70
FEBRUARY	17.70
MARCH	16.50
IIQ	16.70
IIIQ	17.20
IVQ	18.00
YEAR	17.30

TABLE 3
OPEC OIL PRODUCTION ESTIMATES:
PRICES NEAR CARTEL TARGETS
(MMBD)

FIRST 11 MOS. OF 1986		DECEMBER AGREEMENT	ESTIMATE FOR MAR/ APR 1987
1.72	VENEZUELA	1.50	1.50
4.84	SAUDI ARABIA	4.13	2.80
0.60	ALGERIA	0.60	0.60
1.35	INDONESIA	1.13	1.15
1.88	IRAN	2.26	2.00
1.26	KUWAIT	0.95	1.00
1.40	UAE	0.90	0.95
1.48	NIGERIA	1.24	1.25
1.70	IRAQ*	1.47	1.80
1.07	LIBYA	0.95	0.95
17.30	10-COUNTRY TOTAL	15.13	14.00

* EXCLUDED FROM THE DECEMBER AGREEMENT.

TABLE 4
THE 1987 OIL PRICE OUTLOOK: OPEC HOLDS THE LINE

(\$/BBL, W.T.I., U.S. GULF)

1987								
JAN	FEB	MARCH	APRIL	MAY	JUNE	IIIQ	IVQ	YEAR
18.70	17.70	18.15	18.35	18.50	18.00	17.70	19.20	18.35

TABLE 5
THE 1987 OIL PRICE OUTLOOK: OPEC COLLAPSE SCENARIO

(\$/BBL, W.T.I., U.S. GULF)

1987								
JAN	FEB	MARCH	APRIL	MAY	JUNE	IIIQ	IVQ	YEAR
18.70	17.70	16.75	13.00	13.40	14.10	15.05	16.45	15.65

TABLE 6
THE OIL PRICE OUTLOOK: 1987-90
(\$/BBL, W.T.I., GULF COAST)

	1986	1987	1988	1989	1990
SCENARIO ONE: THE FEBRUARY OUTLOOK	15.30	17.30	18.10	19.70	20.40
SCENARIO TWO: OPEC HOLDS THE LINE	--	18.35	19.40	20.50	22.00
SCENARIO THREE: OPEC COLLAPSE	--	15.65	14.00	14.60	16.80

TABLE 7
FREE WORLD OIL MARKET OUTLOOK
A SELECTED LOOK AT KEY FACTORS
(MMBD, PERIOD AVERAGES)

	FEBRUARY FORECAST			OPEC HOLDS THE LINE		OPEC COLLAPSES	
	1985	1987	1990	1987	1990	1987	1990
TOTAL DEMAND	45.5	47.2	48.4	47.0	47.4	47.0	49.8
OECD	34.0	35.3	36.4	35.2	35.4	35.6	37.6
SUPPLY							
OPEC CRUDE	16.0	17.1	18.6	16.8	17.4	17.9	21.9
NON-OPEC CRUDE	24.2	23.6	22.3	23.7	22.6	23.2	21.2
U.S. CRUDE OIL PRODUCTION	9.0	8.2	7.6	8.3	7.8	8.0	6.5
U.S. CRUDE* OIL IMPORTS	3.0	4.8	5.7	4.6	5.2	5.2	7.9

TABLE 8
U.S. OIL SUPPLY/DEMAND BALANCE
(MMBD)

OIL DEMAND (INCL. REFINED PRODUCT)			
FEBRUARY FORECAST	15.7	16.1	16.4
OPEC HOLDS THE LINE	--	--	16.0
OPEC COLLAPSE	--	--	17.5
DOMESTIC OIL SUPPLY* (ALL SOURCES)			
FEBRUARY FORECAST	10.6	10.3	9.3
OPEC HOLDS THE LINE	--	--	9.5
OPEC COLLAPSE	--	--	8.0

* INCLUDES REFINERY GAIN, NGL'S, ETC.

TABLE 9
AVERAGE CRUDE OIL PRICES: ALTERNATIVE SCENARIOS
($/BBL, W.T.I.)

	1987	1988	1989
OPEC HOLDS THE LINE	18.35	19.40	20.50
FEBRUARY OUTLOOK	17.30	17.70	19.50
OPEC COLLAPSE	15.65	14.00	14.60

TABLE 10
THE IMPACT OF ALTERNATIVE CRUDE OIL PRICES ON LOWER-48 OIL PRODUCTION LEVELS AND COMPETITION, 1987-89

	OPEC COLLAPSES	FEBRUARY OUTLOOK	OPEC HOLDS THE LINE
	1987		
WELLHEAD OIL PRICES	$15.65	$17.30	$18.35
NEW OIL WELLS	17800	18500	22700
STRIPPER WELLS ABANDONED	17000	16200	15600
	1988		
WELLHEAD OIL PRICES	$14.00	$17.70	$19.40
NEW OIL WELLS	17900	18300	22000
STRIPPER WELLS ABANDONED	17800	16300	15500
	1989		
WELLHEAD OIL PRICES	$14.60	$19.50	$20.50
NEW OIL WELLS	17900	19300	23000
STRIPPER WELLS ABANDONED	18000	15800	15300

Figure 1

THE OIL PRICE OUTLOOK: 1987-90
($/BBL, W.T.I., U.S. GULF)

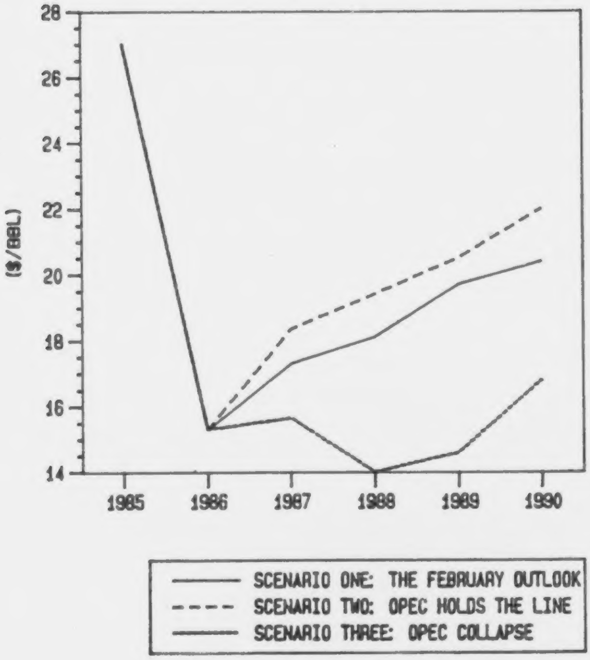


Figure 2

OUTLOOK FOR NEW OIL WELLS DRILLED
(THOUSANDS)

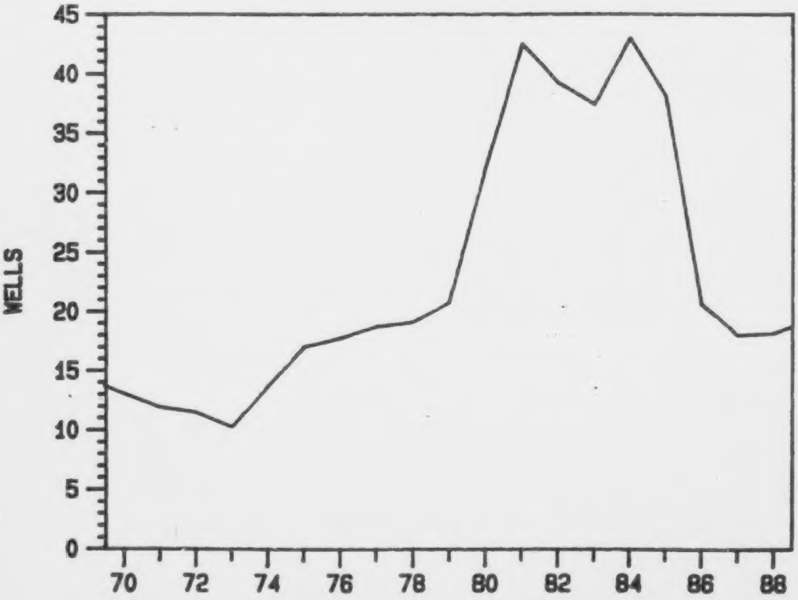


Figure 3

THE NUMBER OF NON-STRIPPER WELLS
(THOUSANDS)

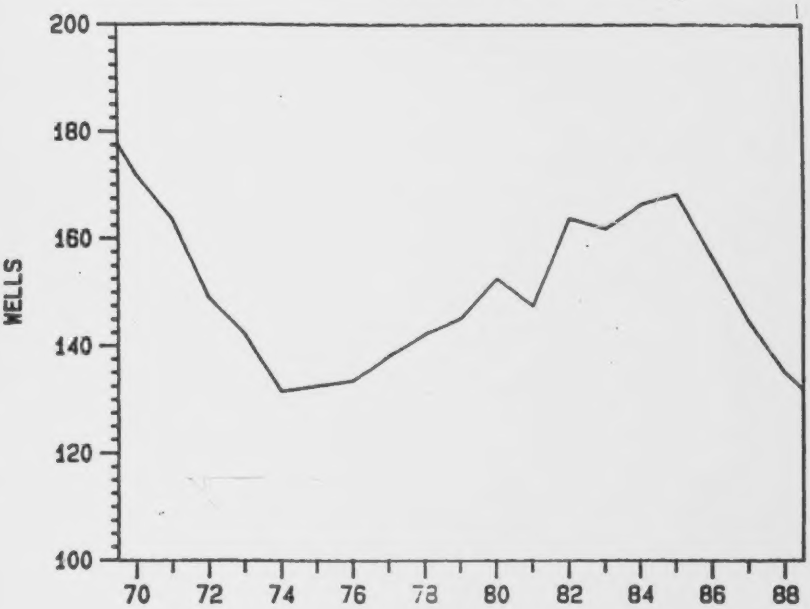


Figure 4

THE NUMBER OF STRIPPER WELLS
(THOUSANDS)

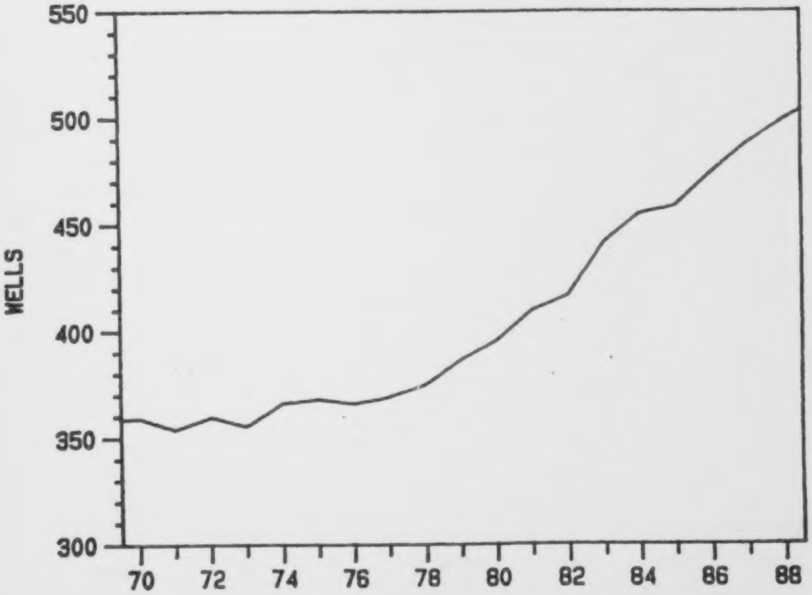


Figure 5

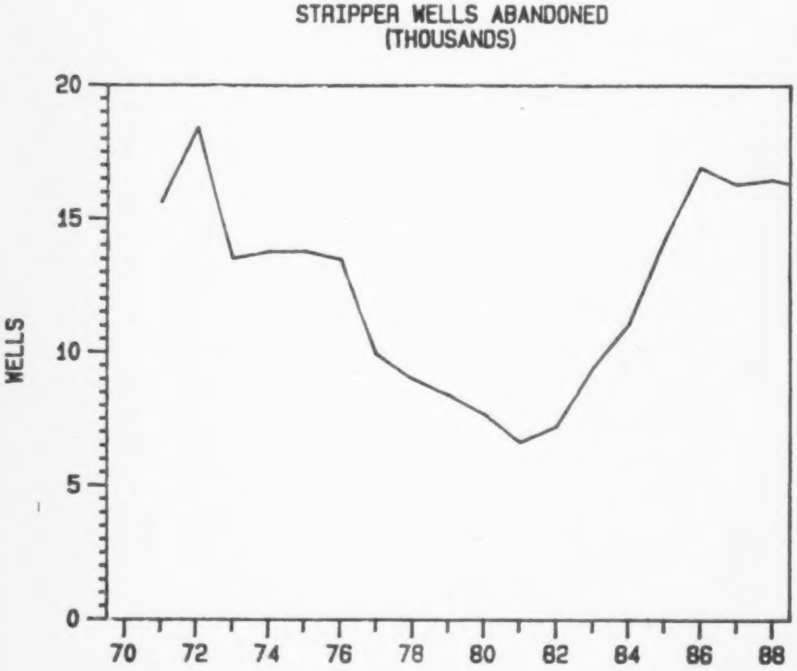


Figure 6

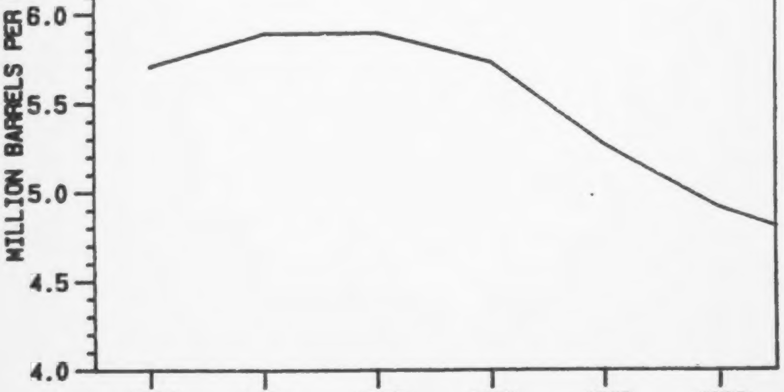
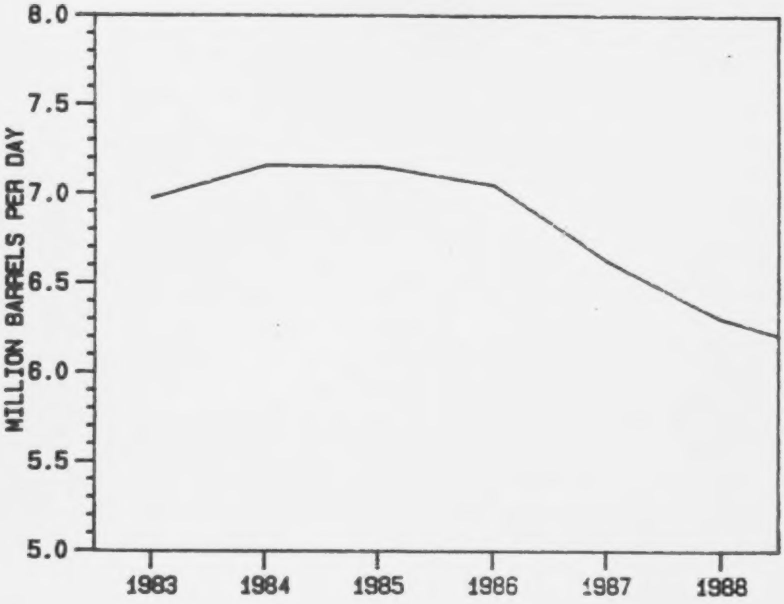


Figure 7

TOTAL CRUDE OIL PRODUCTION IN THE LOWER 48 STATES (MMBD)



The CHAIRMAN. Thank you, very much, Dr. Jones.

Dan Dreyfus.

STATEMENT OF DR. DANIEL A. DREYFUS, VICE PRESIDENT, STRATEGIC ANALYSIS AND ENERGY FORECASTING, GAS RESEARCH INSTITUTE

Dr. DREYFUS. Mr. Chairman, I appreciate this opportunity to appear before the Committee once again. I do not do this much these days.

My statement will draw heavily upon some of the strategic and technology analyses that we do at GRI, but I should point out that some of the judgmental conclusions are my own and do not necessarily reflect the corporate view.

The massive investments that we had in energy using infrastructure that were made during the years between World War II and the middle 1970s have left us with a heritage of an oil-based energy system. Even though the most recent trends have reduced the significance of oil in the energy mix, oil is still a competition to beat in most energy markets. So the world oil price has an influence well beyond just the import price of oil. It exercises tremendous influence over the economics of all other energy forms.

Today the U.S. enjoys comfortable energy supplies. With imported oil still cheap and plentiful, there are surpluses of nearly all the major energy forms. Energy prices are lower across the board, and are popularly expected to remain low. But there are not any sure bets in the energy future. Despite current complacency, the statistics indicate that energy demand growth will absorb our current surpluses in energy supplies, not just in oil but in other forms, by the early 1990s.

The instability of world oil prices and a host of economic and policy uncertainties that confront all of the energy industries have created a climate that is so adverse to long-term investment that very little is being done anywhere to provide for the new supply sources that are going to be needed.

Persistant low world oil prices will further deter the initiatives that are needed in every energy sector. Most directly, the domestic petroleum resource is, as it has been said, a mature and relatively high cost resource as the world goes. The U.S. petroleum industry therefore has been disproportionately impacted by the drop in world oil prices. In a low-price market, U.S. oil production will be the marginal competitor. That is the one that gets turned on and off every time the price goes up or down.

Investments in new production will be threatened by fluctuating world oil prices, and in volatile markets domestic oil investment decisions are likely to be based on the lowest price that has recently been experienced, not on the average price that we get over time.

Although uncertainty about future oil prices thus far have deterred investment in major new oil-fired industrial and electric utility equipment, low oil prices have already encouraged more extensive use of existing oil burning facilities, and greater use of oil in those dual-fuel capable units.

Oil-fired power plants comprise about 12 percent of existing U.S. electric generating capacity. Many of them are old, and until recently have been infrequently operated. They account for a lot of what is popularly thought of as "excess capacity 'in electric generation. Low oil prices will encourage greater use and life extension of this oil-fired capacity.

I read recently that an oil-fired power plant that is older than I am was started up last year. I know that is a bad idea. [Laughter]

During the past year, increased oil use by utilities has directly displaced domestic gas, and in some instances has indirectly replaced coal. The use of oil by electric utilities has increased about 30 percent in 1986. Continued reliance upon oil will deter needed commitments to both coal and gas-fired generating capacity.

Today's easy recourse to low-priced imported petroleum will tend to de-emphasize the decisions and the commitments required to meet the emerging needs of the next decade and beyond. These include progress in clean coal technologies, continued efforts to develop renewable energy sources, and the widespread implementation of advanced technologies for the intensive development of the domestic gas and oil resources.

Low energy prices will also discourage continued progress towards greater efficiency in the use of energy across the board. I might point out that although the U.S. aversion to the greater use of nuclear energy is certainly not a direct consequence of low oil prices, the general complacency about the energy situation is likely also to influence nuclear decisions, because hard choices are rarely made when there is an easy way out.

The natural gas industry is directly impacted by low oil prices at both ends of the transportation system. At the burner tip, gas competes with oil for a large and extremely price sensitive fuel switching industrial and electric utility market. The price of residual oil, which roughly tracks the world oil price of crude, limits the price which can be charged for gas to some 21 percent of current gas demand.

At the wellhead, the economics of gas and oil production are heavily interdependent. Some 20 percent of U.S. gas is produced in association with oil. It is therefore the direct consequence of activity in the oil business. Low oil prices which have depressed oil exploration activity will directly impact the discovery and production of associated gas. Greatly reduced oil revenues to the producer segment will constrain the cash flow that is available for the exploration and development of nonassociated gas, as well.

Now all of these considerations would be academic if we could expect low world oil prices and plentiful supplies of imported oil for the long term. Unfortunately, that is the unprobable scenario.

I have included as an attachment to my statement a full discussion of our current projection for world oil prices. We are projecting the average U.S. refiner acquisition cost in constant dollars to reach about $20 by about 1990, to return to the 1985 level of $27 by 2000, and to reach about $40 by 2010. We think the low prices in mid-1986 were artificially depressed. They discouraged investment in new supplies. They certainly encouraged extensive use of petroleum in discretionary applications, and they create political tensions, as we have seen, in OPEC, in the other producing nations, and in the U.S.

Until 1990, however, the world situation is quite comfortable, and escalation beyond $20 is unlikely. After 1990, production in the U.S. and other non-OPEC free world sources will diminsh rapidly. OPEC's share of production will reach a level of 21 million barrels per day by 1990. That is in excess of the 20 million where most analysts believe that OPEC can begin to set prices.

By 2000, the Middle Eastern OPEC countries alone will be producing 21 million barrels per day. That is the same amount as produced at the peak of the energy crisis. I think John said we would get there sooner.

One point I would like to make is that not only Saudi Arabia at that point but also Iran, Iraq, probably Libya, Kuwait, and possibly other exporting nations will be in a position to unilaterally, without cooperation, without OPEC ministerial meetings, exert considerable influence over prices. Any one of those countries could pull a million barrels a day out of a relatively tight supply.

The probable result will be price escalation, probably occurring as periodic large increases or fluctuations in the nominal price. U.S. production will gradually decline, consumption will increase, and by the mid-1990s imports will exceed the historical peak. By 2000, half of our requirements will come from a Middle Eastern dominated world supply. The outlook, as Dr. Lichtblau said, is threatening.

The most direct influence of world oil prices on natural gas markets I think occurs in the interface between natural gas and residual fuel oil in existing, duel-fuel capable facilities. It is important to understand that a lot of the impact of low and high world oil prices on U.S. demand is not a question of the elasticity of driving, it is a question of turning off and on a very large amount of oil capable equipment. That happens very rapidly. It happens in a $5 range. And it can happen overnight. The damaging effect on the gas industry is tremendous.

The pricing of both residual oil and natural gas at the burner tip are complex. Prices of both commodities vary widely geographically, and certainly in the residual oil area by sulfur content.

If our projections of oil prices are correct and if, as we believe, as the gas bubble is absorbed gas prices must return to the necessary replacement cost of gas (the amount necessary to give U.S. producers a rate of return on investment that is competitive with other investments) there will in the 1990s be a period of time when residual oil and natural gas will be in rather sharp competition.

An important policy point is that if natural gas is to survive that competition, flexible pricing will have to occur. There will have to be a policy attitude and an attitude on the part of the gas industry that pricing to the fuel-switching price sensitive customers will have to be competitive through the early 1990s until oil prices come back up.

The fundamental economics of the long-term sources of natural gas to provide for projected demand are encouraging. Domestic lower 48 production at competitive prices is easily capable of meeting near-term demand. The longer term supplements from Canadian imports improved recovery from discovered domestic resources, production from unconventional lower 48 resources, and a combination of an Alaskan gas or LNG imports can sustain an important role for gas in the national energy supply well into the next century.

The influence of the current competition has directed gas development into lower-cost resources and has squeezed a lot of the economic rent and a lot of the peak cost of production out of the system.

Once the current surplus deliverability is absorbed, wellhead prices for new gas will have to firm from today's low spot prices which do not reflect replacement costs. This is evident, I think, from the low drilling activity today. But we would expect an efficient gas industry working in the anticipation of competition from oil to achieve the required production at lower costs than historical experience might imply. We think that, depending upon drilling activity and the vagaries of the weather, as early as the 1987 to 1988 winter season, or certainly the following winter, tightened supplies in some regions will trigger seasonally higher spot prices for gas. That should in turn result in renewed interest in the value of assured supplies, longer term contracts with producers, and a climate that should encourage producer investment.

We believe that wellhead prices in the range of $2.50 in the 1990 time frame will be adequate to produce the required drilling activity to maintain supplies.

In order to attract new investment into exploration and development of gas, it is necessary to balance the requirements for adequate rate of return on producer investments against intense burner tip competition with low-priced oil. At the wellhead end of the pipe, there are some short-term supply considerations that are not reflected in the fundamentals of the longer term outlook.

The level of drilling activity today is insufficient to support longer term supplies. The confidence and the participation of the investment community will be essential in the required remobilization of producer activity. In view of the unfortunate recent history of domestic production investments, a priority is going to be placed on new gas development opportunities—and oil, as well, I might add—that have relatively low initial capital costs, minimium risk, and quick cash flow.

These criteria do not favor frontier development either in the U.S. or Canada. We believe that R&D in unconventional gas and improved recovery of gas in place offers opportunities to improve production in that kind of an investment environment.

I appreciated Mr. Jones' plug for gas in the strategic national outlook. I will add my own. Natural gas is an environmentally desirable energy source. There is a large domestic resource and an even larger North American resource.

When I worked for this Committee, Senator Jackson taught me that the best strategy for an uncertain future is to keep your options open. With regard to the uncertain energy future, I believe such a national strategy translates into diversification among energy supply forms, and diversification among the sources that are serving the U.S. economy. That has been the strategy in Japan. It is probably the only strategy that makes sense.

The in-place gas transportation and distribution system is an invaluable national asset, coupled with large reserves. Policies that ensure a continued strong role for gas in the national energy mix are the most practical and economic options for energy security.

That completes my summary, Mr. Chairman. I have some attachments and a full statement. I ask that they be placed into the record at an appropriate place.

The CHAIRMAN. Yes, without objection.

[The prepared statement of Dr. Dreyfus follows:]

Statement of Dr. Daniel A. Dreyfus

Vice President

Strategic Analysis and Energy Forecasting

Gas Research Institute

before

The Committee on Energy and Natural Resources

United States Senate

for

an oversight Hearing on

The World Oil Outlook

March 11, 1987

Statement of Dr. Daniel A. Dreyfus
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Introduction

Mr. Chairman, I appreciate your invitation to present a statement to the Committee on the "World oil outlook and its implications for natural gas in the U.S. energy future."

I am Dan Dreyfus, Vice President for Strategic Analysis and Energy Forecasting of the Gas Research Institute (GRI). GRI is a not-for-profit membership organization sponsored by natural gas pipeline and distribution companies. GRI plans, manages, and develops financing for a cooperative research and development program designed to advance the technologies for gas supply, transport, storage, and end-use and to conduct related basic research. GRI acts as an R&D investment broker by bringing together the research and business expertise of universities, manufacturers, R&D institutions, and government laboratories to focus on the needs of the regulated gas industry and its customers. Over 300 individual projects are currently being performed by leading research organizations under GRI contracts.

GRI intends its research and development investments to address the most important technological issues confronting the natural gas industry and to provide the maximum benefits to the industry and its customers. In order to plan and evaluate its R&D program, GRI prepares an annual comprehensive projection of U.S. energy supply and demand, with particular emphasis on the role of natural gas, and carries out a continuing program of economic research concerning energy issues that may affect the viability of new gas technologies.

My statement will draw heavily upon strategic and technology analyses carried out by GRI; however, some of the judgmental conclusions I will offer are my own and not necessarily the corporate views of GRI.

The Significance of the World Oil Price

During the decades of relatively low oil prices which preceded the price shocks of the 1970s, the inherent qualities of petroleum products made oil the fuel of choice for a wide range of energy uses. Massive investments in energy-using infrastructure were made during the years between World War II and the mid-1970s that leave us with the heritage of an oil-based energy system. Although more recent trends have reduced its significance in the energy mix, oil is still the competition to beat in most energy markets. The world oil price, therefore, exercises tremendous influence over the economics of all other energy forms.

Today, the U.S. enjoys comfortable energy supplies. With imported oil cheap and plentiful, there are surpluses of nearly all of the major energy forms. Energy prices are low and popularly expected to remain low.

But there are no sure bets in the national energy future. Despite current complacency, the statistics indicate that inexorable demand growth will absorb our current surpluses in energy supplies by the early 1990s. The instability of world oil prices and a host of economic and policy uncertainties confronting the energy industries have created a climate so adverse to long-term investment that little is being done to provide for the new supply sources that will be needed. Persistent low world oil prices will further deter the initiatives that are needed in every energy sector.

Most directly, the domestic petroleum resource is mature and relatively high cost. The U.S. petroleum industry, therefore, has been disproportionately impacted by the drop in world oil prices. In a low price market, U.S. oil production will be the marginal competitor. Investments in new production will be threatened by fluctuating world prices. In volatile markets, domestic oil investment decisions are likely to be based, not on the average expected price over time, but the lowest prices experienced.

Although uncertainty about future oil prices has thus far deterred investment in new oil-fired industrial and electric utility equipment, low current prices have encouraged more extensive use of existing oil-burning facilities and greater use of oil in dual-fuel capable units. Oil-fired powerplants comprise about 12 percent of existing U.S. electrical generating capacity. Many of them are old and until recently have been infrequently operated. They account for much of the so-called "under-utilized capacity" that currently exists. Low oil prices will encourage greater use and life extension of this oil-fired capacity. During the past year, increased oil use by utilities has directly displaced domestic gas, and in some instances indirectly displaced coal. Continued reliance upon oil will deter needed commitments to new coal and gas-fired capacity.

Today's easy recourse to low priced imported petroleum will tend to deemphasize the decisions and the commitments required to meet the emerging needs of the next decade and beyond. These include progress in clean coal technologies, continued efforts to develop renewable energy sources, and the widespread implementation of advanced technologies for the intensive development of domestic gas and oil resources. Low energy prices will also discourage continued progress toward greater efficiency in the use of energy across the board.

Although the U.S. aversion to greater use of nuclear energy has not been a direct consequence of low oil prices, complacency about the energy situation is also likely to influence decisions in that sector. Hard choices are rarely made while there is an easy way out.

The natural gas industry is directly impacted by low oil prices at both ends of the transportation system. At the burnertip, gas competes with oil for a large and extremely price-sensitive, fuel-switching industrial and electric utility market. The price of residual fuel oil, which roughly tracks the world price of crude, limits the price which can be charged for gas for some 21 percent of current gas demand.

At the wellhead, the economics of gas and oil production are heavily interdependent. Some 20 percent of U.S. gas is produced in association with oil. Low oil prices which have depressed oil exploration activity will directly impact the discovery and production of associated gas. Greatly reduced oil revenues to producers will constrain the cash flow available for the exploration and development of non-associated gas as well.

World Oil Outlook

All of these considerations would be academic, of course, if we could expect low world oil prices and plentiful supplies for the long-term future. Unfortunately, that is an improbable scenario.

I have included as an attachment to my statement a discussion of the current GRI projection of world oil prices. We recognize the severe reduction in crude oil prices that occurred since early 1986, and we expect prices to firm gradually. We project the average U.S. refiner's acquisition cost of crude oil in constant dollars to reach about $20 by 1990, return to the 1985 level of $27 by 2000, and reach about $40 by 2010.

The theory underlying this price path is that the low prices of mid-1986, in the $10 to $15 range, were artificially depressed. They discourage investment in new supply sources, they encourage more extensive use of petroleum in discretionary applications, and they create political tensions by increasing U.S. imports and restricting the revenues to the densely populated exporting nations. We believe, therefore, that prices will tend to approach $20 between now and 1990.

Until 1990, the global oil supply situation will remain comfortable. The call on OPEC sources will be low in historical terms and U.S. production will hold up pretty well.

After 1990, production in the U.S. and other non-OPEC Free World sources will diminish rapidly. OPEC's share of production will reach a level of 21 million barrels per day in 1990, which is in excess of the 20 million barrel level that is considered by many analysts to signal the return of OPEC dominance of the pricing strategy. Supply will tighten sufficiently by 1990 to support escalation in real prices. We have chosen an average annual real price escalation rate of about two and one half percent (from a relatively low base price) between 1990 and 2000.

By 2000, the Middle Eastern OPEC countries alone will be producing 21 million barrels per day, the same amount produced at the peak of the "energy crisis" in 1978. Moreover, not only Saudi Arabia, but also Iran, Iraq, Libya, Kuwait and several other exporting nations would be in positions to exert considerable unilateral influence over prices. The probable result will be an increased price escalation, probably occurring as periodic large increases in the nominal price. We have represented that situation by a four percent average annual increase in real dollars after 2000.

Meanwhile, U.S. petroleum demand will gradually increase and U.S. production is projected to decline. Average annual net imports of crude and products, therefore, will exceed 6 million barrels per day in 1990. In the mid-1990s, imports will exceed the 1977 historical peak of 8.6 million barrels. By 2000, more than half of the U.S. requirements for petroleum will be imported, making us critically dependent upon a Middle Eastern-dominated world oil trade.

This outlook is threatening. While the world petroleum supply balance can be supported at the prices in our projection, renewed dominance over the market by Middle Eastern suppliers begins in the early-1990s. Thereafter, the situation presents a political possibility, if not the probability, of much higher prices, or at least of intermittent severe price shocks. Extreme instability in the world price coupled with large imports would have severe repercussions for the U.S. economy

The Impact on Natural Gas

The most direct influence of world oil prices on natural gas markets occurs in the interface between natural gas and residual fuel oil in existing dual-fuel capable facilities. The statistics of this market are scarce and outdated, but we have estimated that about 3.8 Tcf of current gas consumption is in direct competition with residual oil in dual-fired or readily converted facilities.

The pricing of both residual oil and natural gas at the burnertip are complex. Prices of both commodities vary widely; geographically, among demand sectors, and in the case of resid to reflect sulphur content.

As I have said, we believe that oil prices will return quickly to the $20 range and fluctuate about that level. If we are correct, prices for residual oil on the average must become sufficiently high ($3.00 per million Btu or more) to provide refiners with a margin of profitability across the product slate. Such prices will be too high to displace coal in new facilities or even to encourage extensive use of existing oil-fired electric generating capacity.

Some residual oil will continue to be an inevitable result of the production of other petroleum products, however, and whatever amount is produced must find a market. Low priced resid will occasionally result from seasonal demand fluctuations, increasing refinery runs to produce greater quantities of lighter products and global displacement of resid by newly constructed nuclear and coal-fired powerplants. Resid will continue to place a ceiling upon gas prices and compete for gas markets into the 1990s.

Natural Gas Pricing

The fundamental economics of long-term sources of natural gas to supply projected demand requirements are encouraging. Domestic lower-48 production at competitive prices is easily capable of meeting near-term demand. In the longer-term, supplements from Canadian imports, improved recovery from discovered domestic resources, production from unconventional lower-48 resources, and a combination of Alaskan gas and liquified natural gas imports can sustain an important role for gas in the national energy supply mix well into the next century.

The influence of current and expected low wellhead prices has directed gas and oil development into the lower cost resource areas. The extremely high drilling costs of the early 1980s are no longer a factor. Whatever economic rents were present in the system have been squeezed out by intense competition.

Once the current surplus deliverability is absorbed, wellhead prices for new gas will have to firm somewhat from today's low spot prices to attract adequate new investment into gas exploration and development. This is evident from the very low drilling activity at current expected prices. But we expect a more efficient industry, working in the anticipation of continuing intense competition, to achieve the required production at lower costs than earlier historical experience would have implied.

As the excess deliverability of natural gas diminishes over the next one to three years, it is probable that spot gas supplies first will become tight in some regions in the winter season. Depending upon trends in drilling activity and the vagaries of the weather, as early as the 1987-88 winter season, tightened supplies in some regions could trigger seasonally higher spot prices, renewed interest in the value of assured supplies, and longer-term contracts with producers. We expect average wellhead prices in the range of $2.50 per million Btus in 1990 to be adequate to support the required drilling activity if an orderly recovery in producer investment is achieved.

Although this price level would be only slightly above the actual average acquisition price in 1985, continued low world oil prices would still present a competitive problem in the extremely price sensitive fuel-switching markets. There is, of course, a wide diversity of commodity pricing and transportation markups for both gas and resid to various classes of users and geographic demand centers. So the competition for these markets would not turn entirely upon national average price ratios. An important factor in the outcome of this competition will be the evolutionary development of flexible or incentive pricing of gas to the price-sensitive users who are capable of switching to alternative fuels.

In order to attract new investment into the exploration and development of gas in the 1990 timeframe, it will be necessary to balance the requirements for adequate returns on producer investments against the intense burnertip competition of low cost oil. All segments of the gas industry, as well as public policymakers, will have to recognize the importance of achieving that balance during the next few years. Failure to retain these markets would result both in increased oil imports and in a delayed recovery of domestic gas production.

At the wellhead end of the pipeline, there also are some short-term supply considerations that are not reflected in the fundamentals of the longer-term outlook. The level of drilling activity today is insufficient to support the longer-term supply requirement. The confidence and participation of the investment community will be essential factors in the required remobilization of producer activity. In view of the unfortunate recent history of domestic production investments, a priority will be placed upon new gas development opportunities that have relatively low initial capital costs and minimum risk, and that offer quick returns on investment. These criteria do not favor frontier development, either in the U.S. or in Canada.

We believe that the improved recovery of gas in discovered fields and production from unconventional resources in explored areas that already have transportation and production infrastructure represent such opportunities. They avoid the initial costs and risks of exploration and the front-end investment in infrastructure. If operators can gain confidence in the techniques and technologies required, such production can greatly facilitate the transition from the "bubble" to a more stable long-term investment climate. GRI is actively pursuing R&D to advance these technologies.

Conclusions

In summary, as the current gas bubble diminishes, a transition to a supply and demand balance must be achieved. The transition can be accomplished with only moderate escalation in average gas prices at the wellhead and flexible pricing of gas to some dual-fuel capable customers until oil prices escalate. Temporary loss of winter load in some regions due to high spot prices and fuel-switching might accompany the end of the gas bubble, but aggressive and efficient responses by all segments of the industry can prevent any serious or permanent loss of market share.

It is vital to the national interest that gas succeed in maintaining its market share during this transition. Any permanent loss of the fuel-switching market to petroleum translates directly into increased net oil imports and increased jeopardy when the political and economic consequences of oil dependence are again felt.

When I worked for this Committee, Senator Jackson taught me that the best strategy for confronting an uncertain future was to "keep your options open." With regard to the uncertain energy future, that strategy translates into diversification among the energy supply forms and sources serving the U.S. economy.

Natural gas is an environmentally desirable energy source with a large domestic and even larger North American resource capability and with a wide range of other economically viable supplemental sources. The in-place gas transportation and distribution system is an invaluable national asset. Policies that can ensure a continued strong role for gas in the national energy future are among the most practical and economic options for energy security.

A summary of the 1986 GRI Baseline Projection of U.S. Energy Supply and Demand has been submitted with my statement. It describes this outlook in more detail.

Mr. Chairman: That completes my statement. I ask that the attachments I have submitted be included in the transcript of the hearing at an appropriate place.

Attachments: Description of the Global Petroleum Supply and Demand Outlook of the 1986 GRI Baseline Projection of U.S. Energy Supply and Demand; Policy Implications of the 1986 GRI Baseline Projection of U.S. Energy Supply and Demand to 2010

DESCRIPTION OF THE GLOBAL PETROLEUM SUPPLY AND DEMAND OUTLOOK

OF THE

1986 GRI BASELINE PROJECTION OF U.S. ENERGY SUPPLY AND DEMAND

by
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October, 1986

Introduction

GRI prepares an annual baseline projection of U.S. energy supply and demand as the basis for the strategic planning of its research and development program. One input to the baseline projection is an assumption of the future price track for the U.S. refiners' acquisition cost of crude oil. From this price track, regional prices for petroleum products are estimated for each product and demand sector. For the analysis of future oil and gas supplies, a consistent projection of the wellhead crude oil prices that would be expected by producers is also developed. A major portion of U.S. petroleum supply is imported and as crude oil is internationally traded, the price is set in the global market. Any projection of the oil price outlook, therefore, must be based upon an evaluation of the global petroleum market outlook.

Through the 1985 projection, the assumed oil price tracks used in the preparation of GRI Baseline Projections have been based upon a general consideration of the world oil supply and demand outlook. No effort, however, had been made to prepare an explicit global scenario.

The severe reduction in world oil prices in early 1986 emphasized the significance of the world oil market to energy pricing, interfuel competition in U.S. markets, and the outlook for domestic gas and oil production. In the 1986 Baseline Projection, more specific analytical attention has been given to describing the global petroleum supply and demand scenario that is implied by the U.S. economic projection, energy balance, and the petroleum price track. Various sources of information, including specific runs of a world oil model, have been employed to explore the global oil balance consistent with the baseline assumptions and to verify the theory underlying the oil price projection.

The formulation of an oil price track requires assessments of the impact of three interdependent factors which influence the outlook for oil pricing: in the near term, a base year correction; in the mid-term, the evolution of the projected world oil supply and demand balance; and in the long-term, the probable future pricing strategy of the exporting countries. The first of these factors is primarily the effect of another year of historical experience. In other words, each succeeding baseline projection must be corrected to reflect the realities of the new base year. The base year correction also generally influences the near-term outlook (five years) because there is insufficient time for conservation, utilization, or production measures to impact energy markets. Furthermore, the base year market conditions and political considerations are the best indicators of the probability that nominal price increases or decreases might occur in the immediate future.

The probable evolution of world oil demand and supply generally affects the mid-term (1990-1995) as the policy and infrastructure responses to the base year correction become apparent. The supply and demand balance and the probable sources of the required supply indicate the timing and likelihood of longer term real price escalation.

Finally, the probable long-term pricing strategies of the exporting countries, most notably OPEC, affect the formulation of the long-term (1995-2000) oil projection. The identity of key suppliers and the magnitude and rate of growth of their individual supply contributions determine the probable pricing strategy.

1986 Baseline Projection

Table 1 presents the oil price projection adopted for the 1986 GRI Baseline Projection. The oil price track reflects the assumption that prices will firm gradually from current low levels and that the average U.S. refiner's acquisition cost (RAC) of crude will reach $20 per barrel by 1990, and $27 by the year 2000 (both in 1985 dollars). The composite RAC that was paid by refiners in 1985 is not reached again until the year 2000. The corresponding average petroleum product prices resulting from the crude oil price track are presented in Table 2.

Table 1

1986 GRI Baseline Projection of U.S.
Energy Supply and Demand

Projected Average U.S. Refiners' Acquisition
Cost of Crude Oil
(1985$/Barrel)

Year	Price
1985	26.75
1986	18.75
1987	19.00
1988	19.60
1989	20.00
1990	20.40
1995	23.08
2000	26.76

Table 2

Average Petroleum Product Prices
(1985$ / Bbl)

	1985	1990	1995	2000
Residual Fuel (Avg. Retail)	25.55	21.20	28.05	33.27
Distillate Fuel (Avg. Wholesale)	32.46	26.46	29.31	33.22
Jet Fuel - Kerosene	33.30	27.28	30.41	34.67
Gasoline	50.24	44.08	47.33	51.75

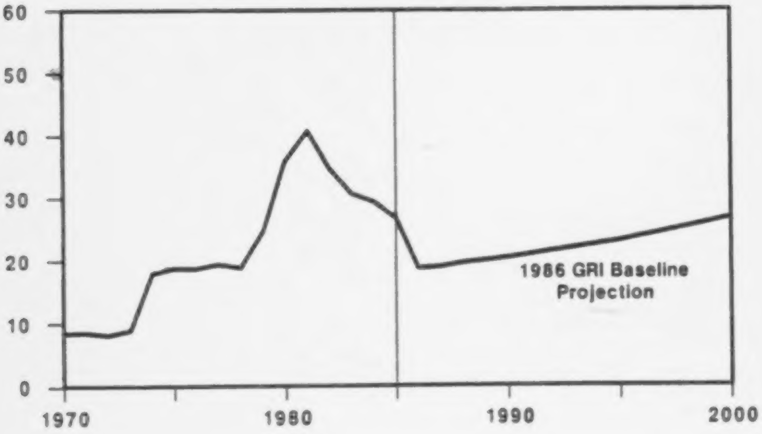
Near-Term Assessment

Figure 1 shows the oil price track for the 1986 GRI Baseline Projection. The significance of the historical average price in the base year of 1985 was lost when an abrupt drop in oil prices of about 50 percent occurred in early 1986. It was necessary, therefore, to estimate the average U.S. refiner's acquisition cost of crude oil for 1986 to develop a base point for the projection. The base point chosen in March, 1986 as an average 1986 price was $18.75 in 1985 dollars. The choice of this average for 1986 was based on the judgment that the very low spot and future prices which were then being reported ($10-$12) were transitory and that prices would recover to the $20 range before the year's end.

Prices near $20 were judged to be relatively stable, having only moderate depressant effects on non-OPEC production and providing sufficient revenues to exporting nations to reduce political pressures for either significant price or production increases. Total global crude oil demand was expected to increase slowly as residual oil continued to be replaced in stationary uses by newly completed coal and nuclear powerplants, by Soviet gas exports, and by the continued development of indigenous energy resources throughout the developing economies. U.S. domestic supplies and other non-OPEC supplies were expected to decline only slightly in the next two to three years near the $20 price level.

Figure 1

U.S. REFINERS' ACQUISITION COST OF CRUDE OIL
(1985$/Bbl)



Mid-Term Assessment

Table 3 presents the estimates of free world oil supply and demand through the year 2000. The table shows that, demand for oil in industrialized countries does not grow appreciably in response to the relatively low oil price projection. The fairly stable demand for oil in the industrialized countries (United States, Western Europe, Japan, and other OECD) is the result of the significant policy and price-induced reactions to the high oil prices experienced in the mid- and late-1970s. In other words, as a result of the two price shocks in the 1970s, the industrialized countries have become increasingly demand inelastic to oil price changes. Between 1985 and 1995, the industrialized countries demand for oil is projected to increase by only 0.9 percent per year, although real economic growth is projected at rates of 2 to 3 percent per year.

The 1986 baseline projection of low oil prices provide the less developed countries (rest of the world) a relief from the previous increases in oil prices that had constrained economic growth. The less developed countries' demand for oil is assumed to be more responsive to oil price reductions that will permit lower capital costs for industrialization, and increased transportation. Considering the high population and low current per capita energy demand, these economies can readily absorb increasing quantities of oil. Between 1985 and 1995, oil demand by less developed countries grows at twice the rate as that of the industrialized countries, or by 1.8 percent per year.

Although total free world oil demand only grows by 1.1 percent per year between 1985 and 1995, the low oil prices constrain free world oil supply. It is probable given current technologies and mature U.S. resources that U.S. production will progressively decline, but the low oil prices hasten the decline as production from high cost and marginal resources becomes uneconomic. The ongoing curtailments in U.S companies' exploration and production budgets, unprecedented reduction of operating drilling rigs, and reduced employment in the oil and gas industry will affect U.S. crude oil production levels during this period. Similarly, production from the generally high cost resources of Western Europe and other non-OPEC will also decline. The only increases in oil production originate from Mexico, which has extensive resources and revenue needs, and Canada. The contribution from Canada, however, is relatively modest, only about 5 to 6 percent of total free world supply. Thus, in aggregate, free world oil supply declines by 0.8 percent per year between 1985 and 1995.

The net effect, then, is a widening gap between free world oil demand and non-OPEC oil supply. The difference, of course, can readily be met with additional OPEC supplies. The increasing scarcity of non-OPEC oil and the increasing need for OPEC oil, however, afford the opportunity for the single-resource exporting nations of the Middle East to recoup earlier revenue losses, repay debt, and repair war damages. The expectation of significant increases in nominal prices in this time frame supports the projection of 2.5 percent growth in real oil prices between 1990 and 1995.

Table 3

1986 GRI Baseline Projection of U.S. Energy Supply and Demand

Non-Communist World Oil Supply/Demand Balance
(MMBD)

	Actual 1985	1990	1995	2000
CONSUMPTION				
United States	15.70	16.38	17.05	18.05
Western Europe	11.64	12.15	12.60	13.80
Japan	4.35	4.50	5.10	5.20
Other OECD	2.54	2.65	2.80	3.00
Rest of World	11.60	12.90	13.80	15.66
TOTAL CONSUMPTION	45.83	48.58	51.35	55.71
SUPPLY: CRUDE & CONDENSATE PRODUCTION				
United States	8.92	8.29	7.17	6.29
Canada (ex. tar sands)	1.30	1.10	1.40	1.50
Mexico	2.73	3.00	3.30	3.60
Western Europe & Other Non-OPEC	9.50	9.47	8.84	8.50
SUBTOTAL NON-OPEC CRUDE & COND.	22.44	21.86	20.71	19.89
NON-OPEC NGL PRODUCTION	2.68	2.56	2.50	2.39
Ecuador	0.28	0.27	0.25	0.23
Venezuela	1.67	1.80	1.90	2.07
Algeria	0.64	0.70	0.75	0.74
Gabon	0.15	0.15	0.13	0.12
Libya	1.06	1.30	1.45	1.60
Nigeria	1.47	1.70	1.80	1.90
Iran	2.20	2.40	3.00	3.60
Iraq	1.43	1.80	2.67	3.50
Kuwait	0.85	1.10	1.60	2.30
Qatar	0.30	0.33	0.40	0.40
United Arab Emirates	1.19	1.30	1.80	2.27
Saudi Arabia	3.22	5.20	6.50	8.90
Neutral Zone	0.34	0.40	0.40	0.45
Indonesia	1.26	1.35	1.45	1.40
SUBTOTAL OPEC CRUDE & COND.	16.06	19.80	24.10	29.48
OPEC NGL PRODUCTION	1.06	1.19	1.54	1.85
TOTAL CRUDE, COND. & NGL PROD.	42.24	45.41	48.85	53.61
Tar Sands, Shale & other syn fuels	0.44	0.40	0.40	0.50
(Losses), Refy Gains & Inven. Chg	1.13	1.17	1.20	1.30
Net Imports from Comm. Countries	1.70	1.60	0.90	0.30
TOTAL OIL SUPPLY	45.51	48.58	51.35	55.71

Long-Term Assessment

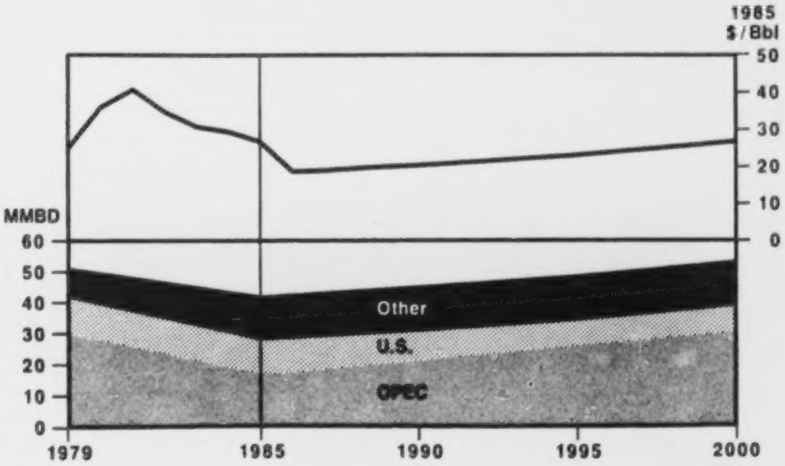
Figure 2 presents the sources of free world oil supply under the projected oil price track. The figure indicates that, after 1990, OPEC's share of oil production rapidly increases as a result of the production declines in non-OPEC countries and increased oil demand. The last factor considered in developing the 1986 oil price projection is an assumption of the long-term pricing strategy that will be adopted by the oil exporting countries.

Between 1985 and the year 2000, OPEC oil production nearly doubles, from 17.1 million barrels per day (MMBD) to 31.3 MMBD. Moreover, the influence of the Middle East increases progressively as OPEC production increases. In 1985, Middle Eastern OPEC supplied 59 percent of total OPEC production. By the year 2000, the share of Middle East production is expected to grow to 73 percent of total OPEC crude production.

As early as 1995, OPEC is projected to produce 26 MMBD, well in excess of the 20 MMBD level considered by many analysts to signal the return of OPEC dominance in the world oil market. By the year 2000, OPEC countries are producing 31 MMBD, the same amount produced prior to the oil price surge in 1978. As a result, the OPEC exporting nations will be in a position to exert considerable upward pressure on oil prices. Furthermore, several countries including Iran, Iraq, and the United Arab Emirates, as well as Saudi Arabia, are at production levels sufficiently high in a tightened supply situation to exert influence over pricing unilaterally or in small groups.

Figure 2

WORLD OIL PRICE/SUPPLY RELATIONSHIP



1986 GRI Baseline Projection

During the 1995 to 2000 period, it is expected that, with real prices above $20 per barrel, OPEC will again be receiving generally comfortable revenue streams. They will also be called upon to increase production each year. GRI has always adhered to the theory that the probable economic and political pricing strategy in that situation will be to require a premium above the inflation rate for increasing withdrawals from the essentially depletable oil resource. The choice of a rate of real price increase is, of course, problematical. An annual increase of 2 percent real was widely believed to represent an optimum OPEC revenue producing policy, but was based upon prices in the $30 to $50 range. A greater rate of increase in the $20 to $30 price level would involve similar sized nominal price increases. Thus, the increasing dominance of OPEC production in general, and Middle Eastern OPEC production in particular, supports the 3.0 percent growth in real oil prices between 1995 and the year 2000.

In summary, the 1986 GRI oil price track is based upon an expectation that the relatively low near-term oil prices will spur increasing demand by the less developed countries which, in turn, will drive total free world oil demand. The low oil prices, over the same period, will adversely affect oil production from the high cost, mature, and marginal resources of the industrialized countries and discourage the introduction of new high cost frontier supplies. The increasingly tightened supply situation will support moderate increases in prices above the general inflation rate. Finally, in the long-term, the pricing strategies of a few large exporters will again dominate the world oil market leading to more rapid escalation in prices.

Uncertainties

There are several considerations that could significantly alter this outlook. The first is simply timing. For example, petroleum demand might be greatly increased by some shortfall in alternative energy supplies. Alternatively, new oil sources might enter the market delaying the timing of potential price increases. Second, it is probable that actual price changes will be more abrupt and possibly cyclical in nature, rather than following the smooth rates of change outlined in the projection. Although it is not possible to predict such abrupt changes, the timing and magnitude of significant increases and decreases in price can greatly influence the economic and behavioral responses to the underlying price trends.

Finally, there is the inherent instability of the current supply and demand situation, such that large amounts of low cost OPEC production capacity are being held out of service while much higher cost resources are being produced. The political manipulation of the supply system over an extended period overshadows any effort to evaluate oil prices in terms of the economics of supply and demand balances. Judgments about the future political and economic motivations of exporting nations must continually be reevaluated as the situation changes.

Questions or comments concerning the Description of the Global Petroleum Supply and Demand Outlook of the 1986 GRI Baseline Projection should be directed to Anne B. Ashby of GRI's Strategic Analysis and Energy Forecasting Division located at 1331 Pennsylvania Avenue, N.W., Suite 730 North, Washington D.C. 20004-1703; telephone, (202) 662-8989.

POLICY IMPLICATIONS OF THE 1986 GRI BASELINE PROJECTION OF U.S. ENERGY SUPPLY AND DEMAND TO 2010

Introduction

Overview

This paper briefly summarizes the 1986 GRI Baseline Projection of U.S. Energy Supply and Demand and highlights the policy implications that have been identified in the projection. The baseline projection is used primarily as a strategic planning tool in the development of the GRI research and development program and for evaluating the potential impact of R&D programs and projects. The projection also reveals a number of significant issues that are of interest not only to GRI but to energy companies, policy makers, and others involved in energy markets.

One of the most important factors confronting this year's forecasting activity was the fall in world oil prices which occurred in early 1986. The 1986 projection includes a projection of lower refiner acquisition costs of crude oil than incorporated in previous projections. In constant 1985 dollars oil is projected to cost $20 per barrel in 1990, $27 in 2000, and $40 in 2010.

The new projection confirms that despite the recent oil price reduction and the unprecedented slump in drilling activity for both oil and gas, an orderly transition from the current gas bubble to a balanced supply situation can be accomplished. Over the longer term, abundant, feasible supply options exist to support a strong, competitive industry well into the next century. If commitments to new supply sources are made in a timely fashion, the long range supply can support growth opportunities for gas markets particularly in the electric utility sector.

The projection confirms that the major opportunities to sustain or increase natural gas consumption are closely related to the successful development of new gas utilization and gas supply technologies. New gas utilization technologies for applications such as cogeneration, cooling, and electric generation will help to maintain the role of gas in serving overall U.S. energy requirements in the coming years. New supply technologies, particulary advanced techniques for production from unconventional gas resources, will enhance the competitive position of gas in interfuel competition and assure the reliability of long-term supplies. Intense interfuel competition at the burner tip will also place increasing emphasis upon technologies to improve the efficiency of transportation and distribution.

Implications of the Projection

The developments over the past year add significance to several issues that confront the natural gas industry and relate to the planning of a natural gas technology base:

- The severe reduction in world oil prices in early 1986 emphasized the impact of the world oil market on energy pricing, interfuel competition, and the outlook for domestic gas and oil production. The 1986 GRI Baseline Projection is based upon an expectation that the relatively low near-term oil prices will spur increasing demand for Middle Eastern OPEC production which, in turn, will begin to exert upward pressure on prices after 1990. However, even with this upturn, oil prices will remain at levels insufficient to prevent a decline in U.S. oil production as high-cost and marginal resources become uneconomic. Therefore, in the projected scenario, by the year 2000, 10 million barrels per day or more than half of the U.S. requirements for petroleum would be imported, making the U.S. critically dependent upon Middle Eastern-dominated world oil trade.
- Some energy analysts expect U.S. oil prices to follow a price track even lower than that incorporated in the baseline projection. In such a scenario, both U.S. natural gas supplies and consumption would be constrained. However, this price track also leads to an international oil supply situation in which OPEC would be required to reach levels of oil production at or near maximum sustainable capacity by 1995, implying that an extended period of oil prices substantially lower than the 1986 GRI Baseline Projection price track is an improbable scenario.
- Total natural gas consumption is projected to decline in 1986 and 1987 relative to the base-year 1985 level as a result of reduced consumption in the industrial and electric utility sectors. A significant portion of this reduction

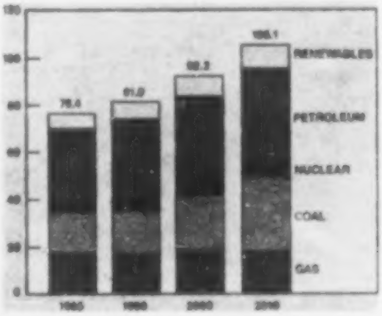
has already occurred. Some of the reasons for the near-term decline are temporary phenomena, and gas consumption can be expected to recover in later years, reaching 18 to 19 quads after 1990.

- Lower projected oil prices, particularly until the mid-1990s, pose strong competition for gas in the industrial and electric utility markets. As the current excess deliverability of natural gas is absorbed, wellhead prices will have to firm to attract new investment in gas exploration and development. Should wellhead gas prices escalate more rapidly than world oil prices, the competition for fuel-switching customers will intensify. One possible solution to this problem is the evolution of flexible pricing approaches that keep gas competitive in the off-peak periods in large industrial and electric utility applications.
- The fundamental economics of gas supply continue to be masked in 1986 by the existence of the "gas bubble." The low wellhead prices now being accepted by financially distressed producers provide no indication of the gas prices that will be necessary to attract new investment into gas exploration and development. If oil and gas prices remain depressed and new investment in well maintenance and drilling is constrained by cash flow, gas supplies might become tight in some regions during a severe winter in the relatively near future. The most probable impact of tightening supply in a free market would be an increase in spot gas prices. Fuel switching by large industrial and power plant customers is likely to rebalance supply and demand at these higher prices, which, in turn, should lead to renewed producer activity and eventual recapture of any load losses. An orderly transition to a stable supply and demand situation could be obstructed, however, by producer financial weakness and protracted low oil prices.

The annual GRI baseline projection is the result of a complex modeling effort that seeks to achieve an internally consistent energy supply and demand outlook across all energy sources and end-use demand sectors. Particular attention is assigned to achieving a rational balance between gas demand and interfuel competition at the "burner tip," or point of use, and the supply of gas that can be obtained at wellhead prices that are consistent with the burnertip prices.

Exhibit 1

PRIMARY ENERGY CONSUMPTION
(Quads)



The 1986 projection indicates that natural gas will continue to play a major role in a highly competitive energy mix well into the next century. As summarized in Exhibit 1, continuing growth in total energy demand is projected through the year 2010 despite continued strong improvements in energy conservation in all demand sectors. Total primary energy consumption is expected to grow at an average annual rate of 1.3 percent, or less than half the rate of GNP growth. Primary natural gas consumption, after declining in 1986 and 1987, is expected to increase modestly from base-year 1985 levels, reaching 18.6 quads in the year 2010. Delivered gas to end-use sectors increases from 17.8 in 1985 to 19.0 quads in 2010.

Total Primary Energy Demand

Total primary energy consumption is projected to grow from 76.4 quads in 1985 to 105.1 quads in 2010, or at 1.3 percent per year while real GNP is projected to grow at 2.9 percent per year. Thus, energy consumption grows at less than one-half the rate of GNP (45 percent) over the projection. This rate reflects not only increasing efficiency of energy use, but the continued restructuring of the U.S. economy into less energy-intensive applications. Although the projected supplies of primary energy are achievable, each source faces potential constraints and uncertainties. Exhibit 2 shows a more detailed breakdown of U.S. primary energy consumption by fuel type.

Expected strong price competition from other fuels, along with a decline in electric utility natural gas demand in the early years of the projection, combine to reduce primary gas demand between 1985 and 1990. Projected primary gas demand falls from 17.7 to 17.2 quads between 1985 and 1990. Between 1990 and 2000, gas consumption is projected to recover, reaching almost 19 quads by 2000. This growth is almost entirely the result of increased electric

Exhibit 2

1986 GRI BASELINE PROJECTION OF U.S. PRIMARY ENERGY CONSUMPTION (Quads)

	Actual 1985[a]	1990	2000	2010
Petroleum	30.9	32.4	35.8	40.7
Gas[b]	17.7	17.2	18.8	18.6
(Total Gas Fuels)[c]	(17.8)	(17.4)	(19.1)	(19.0)
Coal	17.4	18.5	23.3	31.0
Nuclear	4.1	6.1	6.3	5.3
Renewables[d]	6.3	6.8	8.0	9.5
Total	76.4	81.0	92.2	105.1

[a] Taken from the February 1986 DOE/EIA Monthly Energy Review (MER) published in May 1986.

[b] Excludes synthetic gas from petroleum and coal.

[c] Total gas fuels includes 0.2, 0.3, and 0.4 quad of "other" gas, primarily SNG from petroleum and miscellaneous gases and high-Btu coal gas, in 1990, 2000, and 2010, respectively.

[d] Includes hydro, wood, solar, direct geothermal heat, etc.

utility demand. New gas-fired generating facilities are expected to be installed in the late-1990s to respond to short-lead-time needs for generating capacity. After 2000, gas demand flattens out as electric utilities adjust to the growth in electricity demand by adding new coal-fired capacity.

On the presumption of ample world oil supplies at real prices that do not return to those experienced in 1985 until 2000, primary petroleum demand is projected to grow from approximately 31 quads in 1985 to almost 41 quads by 2010 with most of the growth in the industrial and transportation sectors. This results in growing dependence on imports to provide for the projected growth in petroleum demand. Between 1985 and 2010, net oil imports are projected to grow from 4.1 to 13.6 million barrels per day, resulting in the international supply issue discussed later in this report.

Coal consumption is projected to grow at 2.3 percent per year, almost twice the rate of growth in overall primary energy consumption. Primary coal consumption grows from 17.4 quads in 1985 to 31.0 quads by 2010. Much of this growth is in the electric utility sector where coal consumption is projected to grow from 14.5 quads in 1985 to 25.1 quads by 2010. This increasing use of coal will depend upon the availability of the coal mining and transportation capacity at prices competitive with other fuels, and assumes that no new environmental constraints will restrict coal consumption. If this coal is not available or is not used, the energy requirements would need to be met by additional oil imports or gas consumption.

Between 1985 and 1990, the thermal equivalent of nuclear power consumption grows by 50 percent, from 4.1 quads in 1985 to 6.1 quads by 1990. This reflects a growth in available nuclear electric generating capacity from nearly 78 gigawatts in 1985 to 104 gigawatts in 1990. No new orders for nuclear plants are included in the projection and some plants currently considered to be "on order" are assumed to be deferred or cancelled. If this nuclear contribution is further restricted, however, through a reaction to the Chernobyl incident or to the emerging national debate over nuclear waste repository siting, other fuels would be called upon to meet the demand.

Renewable energy consumption has been significantly revised from earlier projections. The estimates were derived from numerous published sources. Owing to the much lower energy prices assumed in the 1986 projection, a more skeptical attitude has been taken concerning published plans for new renewable energy facilities.

Gas Demand

A summary of gas demand by sector is shown in Exhibit 3.

Residential Sector

Total residential energy demand is projected to increase at only 0.5 percent per year (Exhibit 4), from 9.7 quads in 1985 to 11.0 quads in 2010. This is approximately one-half the rate of growth in housing over the period. The modest rate of growth in residential energy consumption reflects an expectation of continued energy conservation, much of which is permanently embedded in new construction practices and in new energy-using equipment available in the marketplace. The improvement in energy efficiency is less than in previous GRI baseline projections, however, reflecting a reduced estimate of conservation improvement in response to lower energy prices.

Gas consumption is projected to decline gradually from 4.5 quads in 1985 to 3.9 quads by 2010, despite a projected increase in the number of gas-heated homes from 45 million in 1985 to roughly 55 million in 2010.

A major factor influencing the projection of residential gas consumption is the availability of a gas pipeline and distribution system infrastructure. Some of the regions in which housing is projected to grow the most rapidly are those in which this pipeline infrastructure is limited. For example, the South Atlantic states are projected to account for a disproportionately high 27 percent of total U.S. population growth between 1985 and 2010. However, access to a pipeline and distribution system infrastructure is particularly low in these states.

Exhibit 3

1986 GRI BASELINE PROJECTION OF GAS DEMAND BY SECTOR (Quads)

	Actual 1985[a]	1990	2000	2010
Residential	4.5	4.5	4.2	3.9
Commercial	2.5	2.6	3.1	3.6
Industrial	7.1	7.2	7.2	6.8
Electric Generation	3.2	2.5	3.9	3.9
Transportation[b]	0.5	0.6	0.7	0.8
Total[c]	17.8	17.4	19.1	19.0

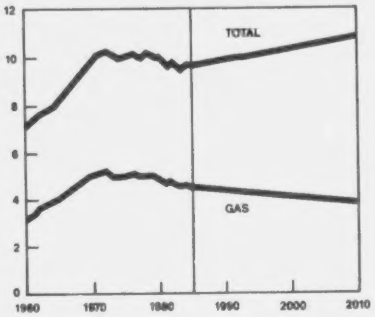
[a] Taken from the February 1986 DOE/EIA Monthly Energy Review (MER) published in May 1986.

[b] Includes less than 0.05 quad of demand by methane vehicles in 1990 and 2000, growing to almost 0.2 quad by 2010.

[c] Includes 0.2, 0.3, and 0.4 quad of "other" gas, primarily SNG from petroleum and miscellaneous gases and high-Btu coal gas, in 1990, 2000, and 2010, respectively.

Exhibit 4

RESIDENTIAL ENERGY CONSUMPTION (Quads)



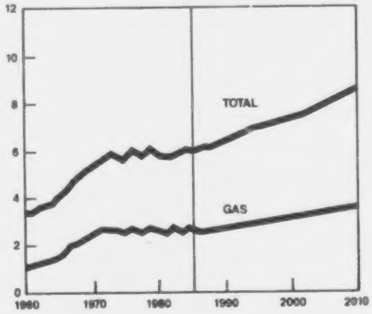
Commercial Sector

Commercial sector building stock growth is expected to slow until the mid-1990s, relative to the growth experienced in the 1980s as a result of recent over-building in many parts of the United States. Beginning in the mid-1990s, commercial sector square footage growth should exceed the rate of growth in GNP.

Total commercial energy consumption is projected to grow from 6.0 quads in 1985 to 8.7 quads by 2010, or at 1.5 percent per year, with a more moderate rate of growth in the early years of the projection (Exhibit 5). The commercial sector represents a potential growth market for natural gas in cogeneration. In the year 2000, almost 19 percent of gas consumed in the commercial sector will be used in cogeneration (0.6 quad). By 2010, gas consumed in cogeneration will account for a projected 22 percent (0.8 quad) of all gas consumed in the commercial sector. A large portion of the potential commercial market for cogeneration is in smaller applications that will require competitive, off-the-shelf equipment rather than site-specific engineered systems.

Exhibit 5

COMMERCIAL ENERGY CONSUMPTION (Quads)



Industrial Sector

Earlier projections made by GRI and others assumed explicitly or implicitly that the old-line manufacturing industries would recover further from the recession and that total industrial energy and gas consumption would increase significantly in 1985. Such a recovery is not occurring and near-term improvement now appears unlikely. As a result, total industrial energy and gas consumption in the base year of 1985 and through 1990 has been adjusted downward in this projection.

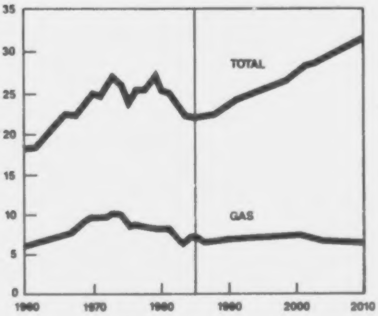
Total industrial energy consumption shown in Exhibit 6 is projected to grow 1.5 percent per year, from 22.1 quads in 1985 to 32.0 quads in 2010. This relatively slow rate of growth reflects continued efficiency gains and, more importantly, the continued restructuring of U.S. industry away from energy-intensive applications.

The gas share of total industrial energy consumption is projected to gradually decline as the result of increased price competition with residual fuel oil in the near term, and increased penetration by electricity and coal in the longer term. Industrial gas demand is expected to remain relatively flat over the projection at approximately 7 quads. Included in this level of demand is a strong growth in gas-fired industrial cogeneration. Between 1985 and 2010, gas consumed in industrial cogeneration grows from 0.3 to 0.7 quad.

The trends in the projection suggest that to compete successfully in the near-term industrial markets, gas will have to be priced flexibly. In the longer term, new gas-using industrial technologies will have to keep pace with or surpass electric and coal-fired innovations.

Exhibit 6

INDUSTRIAL ENERGY CONSUMPTION
(Quads)



Electric Utility Sector

Utility generation of electricity represents an increasing portion of total primary energy consumption over the projection period (Exhibit 7). It grows from 34.7 percent of total primary energy consumption in 1985 to 39.7 percent in 2010. If electricity produced through industrial and commercial cogeneration is included, electricity consumption grows at 2 percent per year between 1985 and 2010 or at 70 percent of the rate of GNP over the projection time frame. The percentage of total electricity demand provided by non-utility sources, such as self generators, increases from 6 percent in 1985 to 10 percent by 2010.

GRI has completed analytical work over the last two years intended to develop an improved methodology for projecting the electric utility outlook. The 1986 projection includes oil and gas (including gas-fired combined cycle facilities) as options for new generating capacity and accounts for load management considerations in an explicit fashion, using regional load duration curves. Consistent with recent actions by electric utilities and regulatory agencies, the gas-use prohibitions of the Fuel Use Act are assumed to be repealed or ineffective because of liberal waivers.

Gas consumption by electric utilities is projected to initially decline and then grow from 3.2 quads in 1985 to

Exhibit 7

1986 GRI BASELINE PROJECTION OF ENERGY CONSUMPTION TO GENERATE ELECTRICITY
(Quads)

	Actual 1985[a]	1990	2000	2010
Petroleum	1.1	1.3	1.6	2.1
Gas	3.2	2.5	3.9	3.9
Coal	14.5	15.0	18.7	25.1
Nuclear	4.1	6.1	6.3	5.3
Hydro	3.3	3.8	4.1	4.3
Renewables[b]	0.3	0.4	0.7	1.0
Total	26.5	29.1	35.3	41.7
Delivered Electricity[c]	7.9	8.8	10.7	12.6
Canadian Imports[d]	0.1	0.2	0.2	0.2
Purchases from Cogenerators[d]	[e]	0.1	0.1	0.1

[a] Taken from the February 1986 DOE/EIA Monthly Energy Review (MER) published in May 1986.

[b] Includes wood, waste, direct geothermal heat etc., used to generate electricity.

[c] "Delivered Electricity" refers only to electricity purchased from electric utilities; it does not include cogeneration for self-use.

[d] Canadian imports and purchases from cogenerators are included in delivered electricity; both represent sources of electricity other than central station generation.

[e] Less than 0.05 quad.

4.0 quads in 2010. This compares with historic high levels of gas consumption in the electric utility sector of 4.1 quads reached in 1971. However, even with this increase, gas' share of electric utility total energy consumption is projected to steadily decline over the projection timeframe.

In the near term, utility gas demand will decline sharply because of new nuclear and coal-fired facilities that come online over this time and strong price competition from residual fuel oil. Most of this decline will come in 1986 and 1987. In the first four months of 1986, utility gas consumption was down about 19 percent when compared with the same period in 1985. Furthermore, a projected 11 new nuclear units and 13 coal units are scheduled to begin operation during 1986.

From 2.5 quads in 1990, gas consumption is projected to recover in the mid- to late-1990s, initially as existing gas-fired capacity is more extensively utilized and later as reserve margins tighten and gas-fired units are chosen for new capacity in some regions. After 2000, gas consumption levels off as utilities have time to plan for continuing demand growth, and add more coal-fired capacity.

Gas Supply

Exhibit 8

1986 GRI BASELINE PROJECTION OF GAS SUPPLIES (Quads)

Current Practice	1985	1990	2000	2010
Lower-48 Base Tech.	16.6	16.3	14.2	8.9
Canada	0.9	1.0	1.6	1.4
Other	0.8	0.4	0.8	1.2
New Initiatives	18.3	17.7	16.6	11.5
Lower-48 Adv. Tech.	0.0	0.3	2.6	4.8
Canada Frontier	0.0	0.0	0.5	1.0
Mexico	0.0	0.0	0.0	1.0
Other	0.0	0.0	0.0	1.3
	0.0	0.3	3.1	8.1
Total Supply	18.3	18.0	19.7	19.6

Two critical factors used as strategic inputs for planning GRI's program are the availability of gas supply and associated prices. Exhibit 8 lists the sources of natural gas supply to meet the requirements of the demand projection. The first line of the table represents natural gas production from the lower-48 United States using available and evolutionary technologies. This projection is derived using the GRI Hydrocarbon Model. The wellhead prices associated with this production are consistent with the regional end-use prices used in the demand projection. At prices competitive with alternative fuels, this production is expected to hold up well in the near term, but diminish significantly in the 1990s. It provides only about three-quarters of total supply in 2000 and less than half in 2010.

In Exhibit 8, the various supplemental sources of gas supplies are classified into two categories. The upper group includes those that are already active or evident in the U.S. supply mix. The primary supplemental source is imported gas from Canada associated with current contractual expectations and developed Canadian resources. Smaller quantities of supply will be provided by peak shaving synthetics, the operating Great Plains gasification plant, and, in later years, the reactivation of existing LNG terminals.

The lower group of supply sources includes those that will require new initiatives or changes in practice in order to fulfill the expectations. Clearly the most significant contribution will be enhanced production from lower-48 unconventional resources, including low-permeability, or "tight" sands, Devonian shale, coal seam methane, and production from watered-out reservoirs. GRI is convinced that the extensive resources available, of which most are already discovered and well known, can provide these levels of production at competitive prices. The achievement of these projected quantities in the time sequences shown, however, will depend upon a sustained and directed R&D program to improve the technologies used in unconventional gas production and make them available and generally employed in the industry.

The portion of Canadian supplies shown in this category, such as the Polar Project to bring gas from Canadian Arctic resources or the infrastructure to develop and transport gas from new offshore regions, will require major capital investments. Renewed imports from Mexico will require policy decisions by Mexico and probably significant investment in infrastructure as well. The other initiatives required to round out this slate of supplies in the post-2000 period include a pipeline transportation system necessary to import North Slope Alaskan gas, either the Alaskan Natural Gas Transportation System (ANGST) or another pipeline, along with possible new small increments of coal gasification.

The outlook presented here is that the resource base is robust and abundant, feasible opportunities exist to support a strong, competitive industry well into the next century, if the necessary commitments are made to new supply sources in a timely fashion.

The projected acquisition price track for natural gas supplies is significantly below earlier projections (Exhibit 9). Several factors have contributed to the reduction. Updating the Hydrocarbon Model resource base to reflect new data has resulted in a more optimistic estimate for the Gulf of Mexico and drilling cost assumptions have been reduced, particularly in the short-term. The competitive influence of low oil prices has directed gas and oil development into the lower cost resource areas and postponed high-cost supplemental gas supplies.

This analytical result is being validated by current experience. In effect, whatever economic rents were present in the system have been squeezed out by intense competition. Wellhead prices for new production will have to firm significantly from today's low spot prices to attract adequate new investment into gas exploration and development, as demonstrated by low current drilling activity. But a more efficient industry, working in the anticipation of continuing intense competition, can achieve the required production at lower costs than earlier historical experience would have implied.

Exhibit 9

1986 GRI BASELINE PROJECTION OF AVERAGE GAS ACQUISITION PRICES (1985$/MMBtu)

	Lower-48 Wellhead		Average
	Base Tech.	Adv. Tech.	All Gas
1985	2.44	—	2.53
1990	2.55	2.76	2.57
2000	3.94	4.09	4.01
2010	5.77	5.82	5.89

Issues

The 1986 projection arrives at a scenario that is compatible with historical experience and observed trends and that recognizes the physical, technical, and economic considerations that constrain the energy system. Although a balanced supply and demand situation is portrayed, there are trends and circumstances within the scenario that highlight uncertainties confronting future energy decisions. In the 1986 projection five important issues were identified by examining the projected trends in light of current circumstances. They include oil price uncertainties and their effect on imports, the impact of an extended period of low oil prices on gas, expectations about near-term gas demand, gas pricing conventions, and near-term gas supply uncertainties.

Future Oil Prices and the Impact on Oil Imports

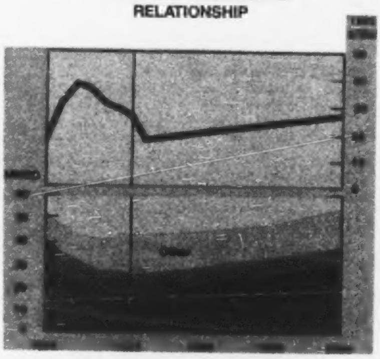
The severe reduction in world oil prices in early 1986 emphasized the significance of the world oil market to energy pricing, interfuel competition in U.S. markets, and the outlook for domestic gas and oil production. In the 1986 GRI Baseline Projection, various sources of information, including specific runs of a world oil model, have been employed to explore the global oil balance consistent with the baseline assumptions and to verify the theory underlying the oil price projection.

The upper portion of Exhibit 10 presents the oil price projection adopted for the 1986 GRI Baseline Projection. Prices will firm gradually from current low levels and the average U.S. refiner acquisition cost (RAC) of crude will reach $20 per barrel by 1990. The real RAC price of $27 paid by refiners in 1985 is not reached again until the year 2000. By 2010, the price is $40 (all in 1985 dollars).

The significance of the average 1985 price as a benchmark for analysis was lost when an abrupt drop in oil prices of about 50 percent occurred in early 1986. It was necessary, therefore, to estimate the average U.S. refiner acquisition cost of crude oil for 1986 as a base point for the projection. The base point chosen in March 1986 as an average 1986 price was $18.75 in 1985 dollars. This estimate was based on a judgment that the very low spot and future prices then being reported ($10 to $12) were transitory and

Exhibit 10

WORLD OIL PRICE/SUPPLY RELATIONSHIP



that prices would recover somewhat before the year's end. Prices near $20 were judged to be relatively stable, having more moderate depressant effects on non-OPEC production and providing sufficient revenues to exporting nations to reduce political pressures for either significant price or production increases.

Exhibit 10 also presents the sources of free world oil supply under the projected oil price track. The exhibit indicates that, after 1990, OPEC's share of oil production rapidly increases as a result of the production declines in non-OPEC countries and increased oil demand. Between 1985 and the year 2000, OPEC oil production nearly doubles, from 17.1 million barrels per day (MMBD) to 31.3 MMBD. Moreover, the influence of the Middle East increases progressively as OPEC production increases. In 1985, Middle Eastern OPEC supplied 62 percent of total OPEC production (10.6 million barrels per day). By the year 2000, the share of Middle East production is expected to grow to 73 percent (23.0 million barrels per day) of total OPEC crude oil production.

Through the year 1995, growth in demand for oil in industrialized countries (United States and Other OECD) is projected to be moderate. Between 1985 and 1995, oil demand in the industrialized countries grows from 34.2 to 37.6 million barrels per day as the effect of low prices is offset by the significant policy- and price-induced reactions to the high oil prices experienced in the mid- and late-1970s. Between 1985 and 1995, the industrialized countries' demand for oil is projected to increase by only 0.9 percent per year, although real economic growth is projected at rates of 2 to 3 percent per year.

Low oil prices provide the less developed countries with relief from the recent high prices that had constrained economic growth. The large population with low current per capita energy demand in these countries can readily absorb increasing quantities of oil. Between 1985 and 1995, oil demand by less developed countries grows at twice the rate as that of the industrialized countries, or by 1.8 percent per year (from 11.6 to 13.8 million barrels per day).

Although total free world oil demand only grows by 1.1 percent per year between 1985 and 1995, the low oil prices also constrain non-OPEC oil supply. The low prices lead to a renewed decline in U.S. oil production as high cost and marginal resources become uneconomic. Similarly, production from the generally high cost resources of Western Europe and Other Non-OPEC will also decline. In the aggregate, non-OPEC free world oil supply declines from 25.1 million barrels per day to 22.3 million barrels per day between 1985 and 1995.

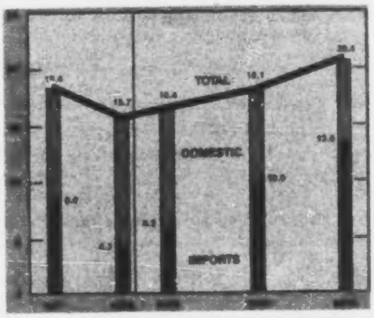
The net effect is a widening gap between free world oil demand and non-OPEC oil supply. The difference, of course, can readily be met with additional Middle Eastern OPEC supplies. The increasing demand upon Middle Eastern suppliers, however, affords the opportunity for the single-resource exporting nations of the Middle East to recoup earlier revenue losses, repay debt, and repair war damages. The expectation of significant increases in nominal prices in this time frame supports the projection of 2.5 percent growth in real oil prices between 1990 and 1995.

During the 1995 to 2000 period, it is expected that, with real prices above $20 per barrel, OPEC will again be receiving generally comfortable revenue streams. The Middle East will also be called upon to increase production each year. GRI has always adhered to the theory that the probable economic and political pricing strategy in that situation will be to require a premium above the inflation rate for increasing withdrawals from a depletable resource that is the mainstay of the economics of this region. Thus, the increasing dominance of OPEC production in general, and Middle Eastern OPEC production in particular, supports the 3.0 percent growth in real oil prices between 1995 and the year 2000.

The 1986 oil price track implies soaring U.S. petroleum imports as characterized in Exhibit 11. The exhibit shows U.S. petroleum consumption increasing at the average rate of 1.1 percent annually or at slightly less than 40 percent of the GNP growth. In the mid-1990s, imports will exceed the 1977 historical peak of 8.6 million barrels per day. In fact, some peak demand months in 1986 have already reached import levels of 8.6 million barrels per day indicating a possibly faster growth track in oil imports than projected in the 1986 GRI Baseline Projection. By 2000, more than half of the U.S. requirements for petroleum will be imported, making the U.S. critically dependent upon Middle Eastern-dominated world oil trade.

Exhibit 11

U.S. OIL SUPPLY
(Millions of Barrels per Day)



Impact of an Extended Period of Low Oil Prices on Gas

In response to a survey initiated by the National Petroleum Council (NPC), GRI evaluated the impact of the NPC low oil price track shown in Exhibit 12. The evaluation indicated that the stress placed on the global petroleum supply and demand relationship creates an incredible situation that implies that the low oil price track is an improbable scenario. The low oil prices would apply pressure on the price of natural gas as industrial users consumed increasing amounts of petroleum. Industrial petroleum consumption would increase from 4 quads in 1985 to 11 quads in the year 2000, an average increase of 7 percent per year. Further, at these price levels total primary liquid fuels consumption was expected to reach 42.8 quads in the year 2000.

At gas prices in the industrial sector competitive with petroleum product prices derived from the very low NPC oil price track, the supply of natural gas would quickly diminish. Domestic natural gas production would fall to 14.0 quads in the year 2000. The availability of imports from Canada also would be constrained to currently developed sources. U.S. natural gas consumption would be limited to 15.8 quads in the year 2000.

As the United States is clearly a high-cost oil producer, domestic production of crude oil similarly decreases under the NPC oil price track. GRI's analysis showed U.S. production falling to 5.0 MMBD in the year 2000. The shortfall in domestic crude supply must be made up by imports. Net imports would account for over 60 percent of domestic oil consumption in 1995 and over 65 percent in the year 2000. Net imports would quickly exceed the 1977 historic peak of 8.6 MMBD.

The oil consumption and production behavior of the United States should also be expected in the other industrialized and high-cost oil producing countries. The less developed countries would substantially increase their rate of oil consumption. Consequently, the demand for OPEC oil would reach 31.6 MMBD in 1995 and 34.6 MMBD in the year 2000.

Exhibit 12

NPC OIL PRICE
SENSITIVITY CASE
(1986$/Bbl)

Year	Composite RAC
1986	$12.00
1990	$14.00
1995	$17.00
2000	$21.00

These levels of oil production are at or near OPEC's maximum sustainable capacity. The exporting countries of the Middle East not only would control the price of crude, but would most likely be reluctant to strive to meet world requirements. Thus, this low oil price scenario envisions a world that is inherently unstable based upon an assumption that excessively high demand for oil does not create greater upward price pressure.

Certainly, world oil prices could remain very low for an extended period, thus creating the initial circumstances shown in the scenario. It is highly improbable, however, that the scenario would persist into the 1990s because of the potential for controlled increases in the prices cited above.

Near-Term Gas Demand

Gas consumption is expected to decline from 17.8 quads in 1985 to 16.8 quads in 1986. Almost all of this decline occurs in the industrial and electric utility sectors. This is a very different outlook than presented in previous GRI baseline projections. The outlook for gas demand, until 1990, in the industrial and electric utility sectors has become much more pessimistic over the past year. The reasons differ somewhat for this expectation in each of the two sectors.

In the industrial sector, earlier projections made by GRI and others assumed explicitly or implicitly that the old-line manufacturing industries would continue to recover from the 1982–83 recession, and that total industrial energy demand and, more specifically, gas demand would increase significantly in 1985. The expected continued economic improvement in old-line manufacturing industries did not occur in 1985. A sharp decline in the dollar on world currency markets did not improve U.S. exports as was expected. Total industrial energy consumption and natural gas consumption were lower in the base year of the new projection (1985) than was anticipated in previous GRI projections. The lower base year history has the longer-term effect of depressing future industrial energy consumption levels.

Recent data indicate that near-term improvement in energy consumption levels is unlikely. The most recent Federal Reserve data show that manufacturing capacity utilization has been steadily declining since the beginning of 1986. Manufacturing capacity utilization was 78.6 percent in June 1986, compared with 80.1 percent in June 1985 and 80.7 percent in January 1986. Furthermore, although the unanticipated collapse of crude oil prices at the end of 1985 lowered fuel costs to many manufacturers, it also had a strong negative economic impact on some regional economies, particularly the South Central region where gas is the fuel of choice in many applications. For example, the Federal Reserve Bank of Dallas has estimated that each 10 percent decline in real oil prices results in approximately a 10 percent decline in employment in oil field service and extraction industries. It was further estimated that a decline in oil prices to $15 per barrel would result in a loss of 130,000 jobs in these sectors in the South Central region relative to the already severely depressed level in December 1985.

As a result of the sharp decline in oil prices, gas also is projected to face strong price competition from oil, specifically residual fuel oil, in the near term. If retail natural gas prices are based upon full replacement costs, residual fuel oil could have a price advantage over natural gas through 1990. For gas to remain competitive in the industrial sector with a low oil price outlook, flexible gas pricing arrangements by producers, pipelines, and distributors will be necessary. This projection reflects a near-term situation in which oil prices recover significantly during 1986. If they do not, the near-term competition from oil will be more difficult.

In the very near term the combination of a declining manufacturing sector, depressed economies in areas where gas use is particularly heavy, and strong price competition from residual fuel oil is likely to result in lower projected near-term gas consumption levels. The 1986 projection includes a 5.6 percent decline in industrial gas consumption, from 7.1 quads in 1985 to 6.7 quads in 1986. In the first four months of 1986, total industrial energy consumption declined by 3.8 percent, and industrial gas consumption declined by almost 12 percent.

After 1986, industrial gas consumption is projected to gradually improve as fuel oil prices increase, gas prices better adjust to compete with residual fuel oil prices, and the outlook for the manufacturing sector improves. Industrial gas consumption is projected to recover to 1985 levels of 7.1 quads by 1989.

Over the next two years, electric utility gas consumption is projected to decline sharply, falling from 3.2 quads in 1985 to 2.4 quads in 1987. The near-term decline in electric utility gas demand is attributable to the completion of the current electric utility building cycle, relatively little increase in near-term electricity demand levels, and strong price competition with residual fuel oil.

During 1985, 17.7 net gigawatts of new capacity was added to the electric utility generating system. Over 90 percent of this new capacity was coal- or nuclear-fired. Further, during 1986 and 1987, according to utility plans, an additional 31.7 gigawatts of new capacity is expected to be added to the electric utility generating system. This marks the high point of the electric utility building cycle begun in the 1960s. The additions in 1986 and 1987 alone represent almost a 5 percent increase in total electric generating capacity. Almost all of these additions are accounted for by new coal and nuclear additions. This acts to sharply reduce the use of both gas and oil for intermediate and baseload electricity generation.

Also contributing to the near-term decline in electric utility gas demand is the slump in the South Central region resulting from the collapse in oil prices. Cumulative data from Edison Electric Institute for 1986 through the week of June 21st shows a 1 percent decline in total electricity generation in the South Central region. This is particularly significant to gas as a result of the heavy concentration of gas electric generation in the South Central region of the United States. In 1985, an estimated 58 percent of all gas consumed in the electric utility sector was in the South Central region.

As was the case in the industrial sector, gas in the electric utility sector is projected to face strong price competition from residual fuel oil. The data available for the first four months of 1986 tend to highlight the extent of this competition. Between January and April of 1986 total electric utility energy consumption declined by 1.4 percent when compared to the previous year. Over the same period, natural gas consumption declined by 18.6 percent, but petroleum consumption increased by 12.8 percent. More recently, in specific cases where gas to residual fuel oil switching has occurred as a result of price differentials, the electric utility has returned to gas when the gas distributor has adjusted his price. As was the case in the industrial sector, this emphasizes the need for flexible pricing arrangements given a low oil price outlook.

Electric utility gas consumption is not projected to recover until after 1990. Little new generating capacity will be added after 1987, until capacity shortfalls become recognized. The 1986 projection shows a requirement for 753 gigawatts of capacity in the year 2000. According to reported utility plans, identifiable planned capacity accounts for only 714 gigawatts and a significant number of planned additions are considered doubtful.

The tightening capacity situation in the mid- to late-1990s, along with the short construction lead times that will be available for utilities to respond, results in a projected increased role of gas for electricity generation in the longer term. From a projected 2.5 quads of gas consumption in 1990, gas consumption by electric utilities is projected to grow to 3.9 quads by 2000. This growth is dependent on the evolution of a stable and competitive supply scenario.

Gas Pricing Conventions

Lower projected oil prices, particularly until the mid-1990s pose strong competition for gas in the industrial and electric utility markets. As the current excess deliverabililty of natural gas is absorbed, wellhead prices will have to firm to attract new investment in gas exploration and development. Should wellhead gas prices escalate more rapidly than world oil prices, the competition for fuel-switching-capable customers will intensify. One possible solution to this problem has evolved in today's competitive fuel-switching market in the form of various flexible pricing approaches.

The fuel-switching-capable customer is viewed as a marginal customer who will go off the system unless he can be retained, by offering him a rate only slightly in excess of the marginal operating cost of the pipeline and/or distribution company serving him. The overall financial efficiency of the transportation system is improved by serving him, even at a transportation rate that does not reflect the prorated share of total system costs associated with the volume he takes (the "fully allocated cost of service").

A factor related to flexible transportation rates is the value that interruptible customers have to the operation of the transportation system. GRI has done some preliminary studies that indicate that, nationally, the ratio of peak to off-peak demand for gas will increase over the next decade, making load management a more significant factor in transportation system economics. Once the current gas excess deliverability has been absorbed, this peak differential should enhance the value of winter gas supply, gas storage capability, and winter transportation capacity. Spot prices for gas are likely to be appreciably higher in the peak demand period. It is possible that large users with fuel-switching capability will independently seek to take advantage of these differentials by using gas primarily in the off-peak periods. The gas industry, also, might increase its reliance upon interruptible customers as a load management approach by offering advantageous rates for off-peak transportation.

The net impact of such flexible pricing approaches might be to make gas more competitive in the off-peak periods in large industrial and electric utility applications. Low prices for transportation, and even low commodity prices at the wellhead, might be justified by scheduled interruptions of service during peak periods and efficient utilization of production and transportation capability in off-peak periods.

Near-Term Gas Supply Uncertainty

During the first three quarters of 1986, the severe reduction in world crude oil prices, the depressant effect on natural gas prices of residual oil competition in the industrial and electric utility markets, and extremely low gas and oil exploration and development activity have focused new attention upon the near-term reliability of natural gas supplies. The financial consequences of reduced oil revenues and the lowest rig counts since World War II have led to concern that producers may be unwilling or unable to finance the rapid increase in activity that will be required when the current excess deliverability or "gas bubble" is absorbed, and that transitory shortfalls in gas supply might develop within the next two to five years.

The fundamental economics of gas supply continue to be masked in 1986 by the existence of the "gas bubble." The American Gas Association (A.G.A.) has estimated that, "excess natural gas production capability increased to 3.6 Tcf in 1985 as a result of reduced gas requirements" and that the bubble will decrease significantly in 1986 to 2.6 Tcf. Excess productive capability of this magnitude stifles the incentive for further exploration and development, even of promising resources. Furthermore, financially distressed producers in need of some cash flow have been willing to accept very low spot prices for gas that has already been found and developed with sunk investment.

As residual oil prices have followed crude oil prices downward to the range of $1.50 per million Btu delivered, fuel-switching, or the threat of fuel-switching, by large industrial and electric utility gas users has driven gas prices to new lows. Although the low wellhead prices accepted by some producers, along with discounted or "incentive" transportation rates, have helped gas to retain much of the fuel-switching market, the resulting price structures provide no indication of the gas prices that will be necessary to attract new investment into gas exploration and development. Spot gas prices, as low as $1.00 in mid-1986, are clearly below the replacement cost to find and develop gas with new investment in even the best resource opportunities.

The replacement cost of gas can be defined as that which covers the costs of finding and producing gas, and which also provides a ten percent real rate of return on the required investment after taxes. Given the oil price scenario used in the 1986 GRI Baseline Projection, a replacement cost for new gas of approximately $2.50 per Mcf in 1986 and 1987 would be necessary to provide incentives for replenishing gas supplies currently being consumed.

GRI analyses indicate that because of the existence of the gas bubble, even at the current low level of drilling activity there is sufficient production capability to meet the probable demand for several years. At current low prices, however, significant investments in well maintenance also may be deferred, diminishing the production capability of existing wells. Although gas demand is likely to be low during 1986 and 1987, if oil and gas prices remain depressed and investment in well maintenance and drilling is constrained by cash flow, the current excess deliverability will diminish and gas supplies might become tight in some regions during a severe winter in the relatively near future.

The early indicators of tight supplies will be high spot prices in the peak winter months and perhaps an inability to fulfill spot contracts in some regions. The initial response projected to result is fuel switching away from gas, and an increase in short-term Canadian imports, not shortages of the type experienced in the 1970s.

The 1986 GRI Baseline Projection assumes that an orderly resumption of producer activity will take place as the bubble is absorbed. The early indicators of tightening supply should encourage greater emphasis upon supply security. The value of secure supplies should begin to be reflected in higher prices for contracts backed by assured resources. The baseline projection analysis indicates that an escalation in the acquisition price for new resources to about $3 in 1990 would be adequate to provide the incentive for increased investment necessary to sustain production during this transition. The gradual introduction of new gas supplies at escalating wellhead prices, however, would only increase the average acquisition cost for all the gas supplied in 1990 to about $2.50 in 1990.

Although the fundamental economics of the exploration and development decisions facing producers would support the outlook presented in the baseline projection, there are two significant factors that could obstruct the orderly transition from the current supply excess to a balanced supply and demand situation.

First, the wellhead or acquisition prices required to provide incentives for increased producer investment, coupled with historical rates for transportation and distribution, would make burnertip gas prices uncompetitive with the projected prices for resid in some regions until after 1990. Market loss, or the threat of market loss, could then hold wellhead gas prices below the level necessary to support renewed investment in drilling activity.

Second, GRI analyses and other independent studies have emphasized the strong correlation between producer cash flow, or net revenues, and drilling activity. If oil prices remain well below recent historical levels, overall exploration and development of U.S. hydrocarbon resources will also remain low. Furthermore, in the face of low expected oil prices or extreme uncertainty of future oil prices, producers are likely to direct investment in oil exploration and development toward lower risk, quick return development drilling and away from high-cost frontier exploration.

Gas reserve additions have relied heavily on new oil exploration. Historically, for every new frontier oil field discovery resulting from exploration, one or more new gas field discoveries have been reported. However, with development drilling, for each new unit of oil reserve addition, only about one- to two-tenths of a unit of new gas reserves is added. Thus, if the recovery in oil drilling activity is focused on development wells, gas reserve additions would remain low despite increased activity.

There are some underlying concepts that will be important in managing the transition.

- Gas producers' current financial problems are a result of low and uncertain demand that has created a supply glut and depressed prices. Increased demand would greatly improve the probability of an orderly recovery to balanced supply by providing greater certainty of return on investment. Elimination of the boom/bust cycle is dependent on the development of new high value uses for gas that increase demand and decouple it from oil pricing. Constraints on gas demand will prolong rather than alleviate the transition to a balanced supply situation.
- With assured markets, wellhead gas prices in the $3.00 range would be adequate to provide attractive investment opportunities for sufficient exploration and development activity to support current demand levels into the mid-1990s. With appropriate rate structures and reasonable recovery of oil prices, burnertip gas prices can also remain competitive with alternative fuels in most markets.
- Any transitory shortfall in gas deliverability in the current deregulated pricing environment is likely to be reflected in high spot prices and loss of fuel-switching customers to alternative fuels during peak load periods, rather than in curtailments.

In summary, as the current gas bubble diminishes, a transition to a balanced supply and demand must be achieved. The transition can be accomplished with only moderate escalation in average gas prices at the wellhead, and some incentive pricing of gas to dual-fuel-capable customers until oil prices escalate. Temporary loss of winter load in some regions due to high spot prices and fuel switching might accompany the end of the gas bubble. If very low oil prices persist, however, there are uncertainties concerning producer investment behavior that might create transitory supply constraints, leading to high spot prices in peak load periods, intermittent loss of fuel-switching markets, or a combination of these effects.

Availability of Full Report

This summary is based on the GRI Insights entitled 1986 *GRI Baseline Projection of U.S. Energy Supply and Demand to 2010* (available Fall 1986) prepared by Paul D. Holtberg, Thomas J. Woods, and Anne B. Ashby of GRI's Strategic Analysis and Energy Forecasting Division. The full report will present a series of summary tables, sectoral breakdowns, the natural gas supply and price trends from the projection, and a comparison with GRI's previous baseline projection. The appendices include a discussion of the methodology and assumptions used to prepare the 1986 projection and provide additional data and discussion on selected energy issues.

Data requests, questions or comments concerning the 1986 GRI Baseline Projection should be directed to GRI's Strategic Analysis and Energy Forecasting Division located at 1331 Pennsylvania Avenue, N.W., Suite 730 North, Washington, D.C. 20004-1703; telephone, (202) 662-8989.

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The **Chairman**. Thank you very much, gentlemen.

Dr. Dreyfus, in the winter of 1976-77 when it got unexpectedly cold, and use of gas was unexpectedly high, and we developed in turn an unexpected shortage, there was a shutdown of industries across the country and several hundred thousand were unemployed.

Now you mentioned that as early as next winter, if it is particularly cold, or even without that the winter after that, we are likely to see some spot shortages of natural gas. Now as I understand it, the shortages of 1976-77 cannot happen now because of the dual-fuel capability of about 40 percent of industry.

Is my figure correct, about 40 percent are dual-fuel capable so that if there was a spot shortage of natural gas that it might be reflected in price, but not in a shortage of fuel?

Dr. **Dreyfus**. Well, let me first of all correct the statement. I did not say that I thought there would be spot shortages. I said I thought there would be increased spot prices. In other words, I think that within the next winter or two the spot market will tighten up and do what spot markets are supposed to do, reflect the transitional supply and demand situation. That should result in spot prices in the January peak that are considerably above the summer prices.

That should encourage people to start to avoid those prices in the following winter by writing long-term contracts with some assured price in it. What you are essentially doing there is assigning a priority to assurance of supply. Today with a free spot market and surplus supply, there is no premium for the assurance of supply.

Now as far as how a winter would work out if there were short, tight supplies, the earlier experience is totally irrelevent to this kind of a situation. The circumstances in the 1970s were that the price of gas was fixed. The markets were fixed. They were largely franchise markets. The users were pretty well fixed, and therefore the attempt to supply a greater amount of gas without any increase in incentive to the producer was a failure.

That winter shortage was also contributed to a little bit by the other fuel sources. We had some frozen rivers and nondelivery of coal, so it was not entirely gas.

The **Chairman**. But there was no dual-fuel capability at that time.

Dr. **Dreyfus**. There was dual-fuel capability, but there was not the freedom for prices to move it around. In other words, the price did not go up. In this case what would happen if spot prices go up is a dual-fuel customer who had a better deal on oil would move to oil, or to coal. The electric power companies who have the ability not only by changing the operation of a particular plant, but also of selecting which capacity runs and moving the power around, would tend to maximize the operation of the coal and oil plants and minimize the gas plants, if their price is higher.

In the 1970s, their price of course did not go higher. The price was the regulated price. The tight market—there was no "spot," it was contract gas, so there was no price increase. If the price goes up in a tight market, yes, users with the discretion to move to other fuels will move to other fuels.

The CHAIRMAN. Well, in other words, what I am saying is the unemployment caused by a shutdown of industry would not happen as a result of short gas supplies.

Dr. DREYFUS. That is a very unlikely situation in the kind of market that we now have, that is right.

The CHAIRMAN. I understand you are not saying that we are going to have a gas shortage next winter or the winter after that. But if the unexpected happened sometime in the next five years and we did have a shortage, it would not shut down industries.

Dr. DREYFUS. No, there is a good five tcf of gas that can be replaced rapidly by other fuels in the United States today, and that is a sizeable part of the market. If you looked at any shortages at all, they would be minimal, well below a tcf.

The CHAIRMAN. I would like to ask a question and direct it to any one of the three of you. No one has spoken about the dismantling of the service industries. We see this dismantling in my part of the country where all of the services which are furnished to drillers are simply disappearing, and disappearing very fast.

What are the implications of that? When called upon again, how quickly can they respond? How quickly can you recreate that service industry? Is that something that you can quantify in your figures?

Dr. JONES. Why don't I start. We have done quite a bit of work on that very topic. The damage is extreme. You cannot restart it quickly. You can hire caterers quickly; you cannot hire experienced drillers quickly. If another 18 months to 2 years passes, the delay could be significant if they were called upon to respond.

Now you can man rigs, but you will be manning rigs with inexperienced crews. Today the efficiency of a drilling rig is very, very high, near record highs, but it is because the crews on the rigs that are left are the most powerful rigs and the most experienced crews.

If you have to go beyond that, you are going to be scraping the bottom of the barrel pretty quickly.

The CHAIRMAN. Let us say the price of oil goes up and the industry is called upon to drill. Is it not likely that the price of drilling a well would go up very precipitously?

Dr. JONES. You will have double-digit inflation in that industry almost instantly.

The CHAIRMAN. Now what degree of confidence do you all have in your projections? I have been sitting at this dias here for 15 years listening to experts. It seems to me that almost none of the big trends have been predicted such as the first oil shock, the second oil shock, the surplus of natural gas, the downturn in prices this time, or the surplus of electricity in almost all of our companies. Some of you I know have predicted some of those trends accurately, but by and large the industry at large has missed most of the trends.

What degree of confidence do you have that, for example, another energy crisis is not right around the corner?

Dr. LICHTBLAU. Well, there is a big difference, Senator, between an energy crisis and increased dependency. I think there is no way we can avoid increased dependency. We have seen it in 1986. It is going to continue in 1987, 1988, and as I said, by the mid-1990s perhaps 50 percent of our oil will come from foreign sources.

That is undersirable from many points of view, but it is not necessarily the cause of an energy crisis. The energy crisis I think is generally associated with gasoline lines, physical shortages, the kind of thing we experienced in 1973 and again in 1979.

The two do not necessarily go together, because an energy crisis can only occur if there is a sudden disruption and we do not have enough oil. That could happen tomorrow morning. It could have happened in 1984, or it may never happen. If it does happen, we can protect ourselves up to a point against it, and I think the Strategic Petroleum Reserve would be a major instrument to do so, if it were filled to the kind of level that we need. It is not anywhere near there, and the Administration's policies to fill it is at a much lower rate.

If there is a disruption, we are a member of the International Energy Agency, which means that we would have to cut back our imports in line with the world shortage of oil. We could not independently try to import as much oil as we would like to, and this is based on our demand, not our import level. Therefore, we would have to cut back our imports in relation to our share of world demand, which means whether we have a 35 percent or a 45 percent import dependency would not greatly exacerbate any kind of an oil shortage that we might experience as a result of a temporary crisis.

The CHAIRMAN. Let me ask you this. In hearings we have held down in Louisiana, our independents gave testimony that it would take a price of between $22 and $24 a barrel to give enough incentive to continue drilling. Now if we had that price, and if there was drilling, then we would not be losing our service industry, would we? Is that correct?

Dr. LICHTBLAU. On a much slower scale. I mean, it would decline because, after all, we had higher prices in 1985. We drilled 2000 wells. As Scott Jones said, you cannot get back to 2000 wells if you have $24 prices. But clearly the industry would not fade out at the $24, $22 prices. There is a big difference between $18 and $24.

The CHAIRMAN. Well, why does it not make sense, then, to have an oil import fee phased out at whatever that figure is, whether it is $24, $23, or $22 a barrel? Why does it not make sense to have that oil import fee to give predictability, stability, and incentive to drilling so that you do not dismantle the service industry, lose your experienced drillers, and then set the scene for double-digit inflation in the oil field country when next called up to drill? Why does that not make perfect sense?

Dr. DREYFUS. Let me make a couple of comments on the oil import fee. Not in GRI but in several other arenas, I have been through some exercises—with the National Petroleum Council and the Aspen Institute—that have discussed this at great length. The difficulty of dealing with this fee is that you have to know what you think about the future.

I think it is certain that a restriction on oil imports one way or another that raises the price paid for U.S. production will increase U.S. production, will deter this fundamental effect of increasing imports and increasing dependence; it will certainly shore up the other energy industries in the United States since they are all in competition with oil. It will firm up gas prices and make the transition out of the bubble much easier. But it will also be very costly to the U.S. economy on a long-term basis.

The first thing that will happen, if you put an oil import fee on, is you will put about a million barrels a day back into the world trade, because you will probably back out enough resid and increase U.S. production enough in the first year that the impact will be very much the same as if the Saudis pumped another million barrels. The remaining oil trade will be in oversupply. So the world price will probably go down as an immediate response.

I think you have to have the determination to hold the U.S. price to about $25, because otherwise you are not going to get much done. That is even if the world price goes back down to $12, which it may well do if you destabilize it. There has to be a certainty about this price level, not that it is on and off, because uncertainty is worse than the low price.

The producers have to realize a cash flow. It cannot go someplace else. In other words, that $25 has to find its way to the wellhead, because cash flow is at least as important as the price itself. Lower prices have simply pulled a lot of money out of the activity in the oil patch, and you have got to put some back in.

And you have to bear up with the economic cost of this until something goes wrong in the world. In other words, it is like an insurance policy. You do not get anything back until the world situation destabilizes and there are some price spikes or a high world price. So you have to have confidence that the world price within the next four or five years is really going to get to be a serious problem.

I think the situation that you face is that most people do not believe that. They think you are into sustaining the U.S. oil industry at an artificially high level for an extended period of time. If you could make the argument that the world situation is going to get really risky and difficult by 1990, sustaining the U.S. production and avoiding this demobilization and mobilization would make a good deal of economic sense.

On the other hand, if nothing goes wrong until the year 2000, it is going to be a very expensive program.

The CHAIRMAN. I think anybody who can look at the situation in the Middle East and have confidence that everything is going to be all right, and that you can trust the Ayatullah is not a good reader of newspapers or history of the last decade.

Well, I have some more questions, but I do not want to overdo my time.

Senator McClure.

Senator MCCLURE. Thank you very much, Mr. Chairman.

Obviously with this panel I think every one of us would like to sit down all day and have an extended discussion of the assumptions and projections that are both intertwined, but let me be very brief.

Dr. Lichtblau, you have indicated that with the current price we can expect a further decline of U.S. production. It is also easy to say that if price rises, that decline is dampened.

Dr. LICHTBLAU. Dampened, but not reversed probably.

Senator MCCLURE. Not reversed. How much price rise is necessary to bring about how much dampening of the decline?

Dr. LICHTBLAU. Well, I think——

Senator MCCLURE. If we got to $22 a barrel, what would happen to decline?

Dr. LICHTBLAU. I think you would see a substantial increase in drilling activities.

Senator MCCLURE. At $22?

Dr. LICHTBLAU. At $22, $23, and I am talking about in the near future, unless you are talking about inflation-adjusted $22 or $23. It would have a significant impact on drilling activities, and it would probably slow down the decline. I do not know by how much exactly, but if you assume another 350,000 barrels per day next year at an $18 or $19 price, it will be significantly less within a year. I do not know whether it would have much of an impact in the very first year because of the time lag involved, but beyond that I think it would have an impact.

So there is no doubt, and it is quite obvious, that if you have a $5, $6 increase in price from the present $18 level, you would do much better in the oil patch for the oil industry for oil producers as well as for the service industry. There is no question about it. I am just saying that the basic trend toward a decline is unlikely to be reversed, even at $24.

You have of course the new situation where costs have gone down substantially. So a $23 price is probably better as far as the incentive is concerned than a $26 price was in 1985. So to that extent, you would be virtually back in terms of incentives where you were in 1985 when you had 75,000 wells drilled.

Senator MCCLURE. Dr. Jones?

Dr. JONES. Part of the problem is that it is a matter of identifying what oil wells you are actually drilling with regard to how much oil you are actually going to add. If you are going to say the price will be $22 a barrel and stable, you will have a much different reaction than if you say the price will hit $22 sometime this year, but we will not guarantee stability.

It turns out that price volatility is far more damaging in that industry than the level of price, so long as the level of price is somewhere above $15 a barrel.

Senator MCCLURE. Well, then if government policy wanted to bring about an increased drilling activity, stability is more important than absolute price?

Dr. JONES. That is right. That was the position earlier this year by the API when the suggestion was to limit the price decline to $14 to $15 a barrel. The argument was not so much about a level of price, but rather a plea for some sort of stability or limiting the downside risk.

Now whether it is $14, or $15, or $17, or $18, or $22 makes a difference ultimately on how much oil will be brought to market, and how much activity will take place. But the stability is the key criteria.

Senator MCCLURE. Dr. Dreyfus.

Dr. DREYFUS. I think that within reasonable ranges of prices, if you could provide some sort of stability above $20 you are probably talking about a difference of 2 million barrels per day in the mid 1990s when this situation in the world certainly begins to get tight. You can argue about whether it will be tight before 1990 or at

1990, but by 1995 you will definitely have an unstable situation. There are probably 2 million barrels per day you can lose or gain in these kinds of ranges that we are talking about.

Senator McCLURE. There is no sharp breaking point in your mind between say $18 a barrel and $24 a barrel? There is a relatively smooth progression on a curve?

Dr. DREYFUS. I think we have pretty much got an $18 per barrel situation now, and the problem is that people are going to figure on $10 or $12 for quite awhile as the downside. The banks are going to ask will it work at $10 or $12 in the United States for several years. $18 is probably not the break point. I think $25 you would begin to see dramatic differences in what can be done in the U.S., because it is only a question of stripper wells, and secondary recovery, and certainly not much frontier work until you get up to $25.

Senator McCLURE. The Department of Energy recently issued its updated forecast of oil supply and demand by the year 2000. That report indicates that by 1995 the U.S. will be 54 percent foreign-dependent, and that by the year 2000 our level of dependence will rise to 61 percent. It also shows a one-third decline in domestic production by the year 2000.

Their worst case analysis predicts that by 1995 the U.S. could be 59 percent foreign-dependent, and that our dependence could rise to 64 percent by the year 2000. In your opinion, does that DOE study accurately assess the situation? Dr. Lichtblau?

Senator BUMPERS. Senator, would you yield for a question on that?

Senator McCLURE. Sure.

Senator BUMPERS. What price assumption is that based on?

Senator McCLURE. That is their median price range assumption, which is in the $18 to $22 a barrel range, as I recall.

Dr. LICHTBLAU. Staying stable in real terms, but rising in current dollars. I'm sorry?

Senator McCLURE. Do you think that is a reasonable forecast?

Dr. LICHTBLAU. Yes. Yes, it is. Of course they have three scenarios.

Senator McCLURE. You do not see it much better or much worse?

Dr. LICHTBLAU. I think a 50 percent dependency on foreign oil by 1995 is not an unreasonable scenario, which is one of the scenarios they have. We have looked at this, and we come up with somewhere between the high 40s and the low 50s by 1995. So I would think this is not at all unlikely.

Senator McCLURE. I do notice that in your statement you say based upon their earlier forecast, the difference between the expected and actual decline is illustrated by the fact that DOE's projection for 1990 was reached in the fourth quarter of 1986.

Dr. LICHTBLAU. That is correct. That is the high case.

Senator McCLURE. Yes. That is why I was asking whether you think the current updated forecast is going to be overoptimistic as the last one was.

Dr. LICHTBLAU. Well, this kind of dependency is a very substantial change from where we have been last year. It could be in the 60 percent range. That is entirely possible. But basically what they are saying is that we are going to have a substantially higher import dependency seven years from now, probably around half, maybe somewhat more. Basically I do not disagree with that.

Senator McCLURE. Dr. Jones?

Dr. JONES. In the written testimony that I submitted, there are some estimates in there that if the price of oil fails to show real price increases to 1995, that those numbers will be low that the Department of Energy has submitted; that we would anticipate their much worse case much nearer to our base case.

Senator McCLURE. Dr. Dreyfus?

Dr. DREYFUS. Well, our projection we have submitted to you. It gets to about 50 percent dependency in the 1990s—well, 50 percent by 2000.

Senator McCLURE. I noticed the annual decline in production is estimated by Chase at 3 percent per year, GRI says 2 percent per year, DOE is saying 4 percent per year. Now that is 2 percentage points, but it is 50 percent difference. It has a multiplier effect over a period of years. I know nobody can predict tomorrow, let alone 10 years from now, with any degree of precision, and the farther out you go, the less sure you can be with the results of the forecast.

Dr. DREYFUS. The agreement is on a production decline. Rather than a question of quantity it is a question of the time frame. Basically they get to the same place, and you are talking about a difference of two or three years. Shifting the curve is what it is about.

Senator McCLURE. Professor Kanouski says that OPEC cannot maintain its quotas; they are already cheating on the last scenario. The price must inevitably decline in the short run. Do you agree?

Dr. LICHTBLAU. Not necessarily. It may decline, but "inevitable" I question seriously. This is an organization which is trying to raise its prices because it is in the interest of every single member to do so. They main fail again, but it is not an inevitable thing. It is not that difficult for a group of countries when they recognize their common interests to enforce them.

I think it is entirely possible that they may do so. However, for an investor to put money on the line on that basis is a different matter. But I would not think this is anywhere near inevitable. Or, if it is, it may be very short-lived. It may collapse again and within six weeks OPEC may have another meeting and they may push prices back up.

Right now we see a remarkable display of OPEC self-discipline, which may not last, but it is a fact that in February OPEC produced below its own quota in order to support the prices that they have decided on.

Senator McCLURE. Dr. Jones.

Dr. JONES. We give it no better than even odds of success. But I think the thing I would like to point out is, this is an extraordinarily risky strategy on the part of OPEC. This is the first time that I can recall that they have ever tried to "bet the ranch" so to speak during the period of unusual seasonal softness in the oil markets.

Normally they play these games in the fall, coming up on the winter demand. The Saudis are clearly the leader in the strategy, and they stand to lose a considerable amount of face. Ultimately, this could be a giant step toward the shift in power in OPEC from the Saudis to the Iranians.

Senator McCLURE. Dr. Dreyfus.

Dr. **Dreyfus**. There is a fair amount of magic somewhere between $18 and $20. That is the break point for a lot of discretionary uses of residual oil so that the demand situation fluctuates.

Basically, below $18 there is a lot of pressure to get the price up, and above $18 there gets to be some pressure to put it down. That is, given the current supply/demand situation.

Clearly there is nothing in the world oil supply situation that would say you could not run it at $10 for quite a while. There is enough profitable oil at $10 in the Middle East to do it. But there has now been a laboratory test now. You have a bad OPEC meeting, and you lose $10 a barrel. You have a good one, and you gain $10 a barrel. No matter how low your learning curve might be, that has certainly got to get through to you sooner or later.

I would agree you could have a bad meeting because of the politics, but you would be crazy if you did not have a good one within about three months. So I would expect to see the price be $18 more often than not over the next two years or so.

Senator **McClure**. Thank you gentlemen, very much. I may have further questions to submit for the record, and I appreciate your testimony.

Thank you, Mr. Chairman.

The **Chairman**. Senator Wirth.

Senator **Wirth**. Thank you very much, Mr. Chairman.

Gentlemen, thank you for being with us this morning. Let me, if I might, in the time available ask you a few questions about price, price incentives, and what you believe we know about them.

You mentioned, Dr. Lichtblau, in your testimony that U.S. production was off by 10 percent——

Dr. **Lichtblau**. In the lower 48.

Senator **Wirth** [continuing]. In the lower 48, in the last year. Do you know what the percentage drop was in the Overthrust belt?

Dr. **Lichtblau**. No, I do not know.

Senator **Wirth**. Do any of you have any idea? There was an enormous increase in activity in that region, which is very important to the economies of that whole area, as Mr. McClure knows, and as Mr. Wallop knows, and so on.

Dr. **Lichtblau**. No.

Dr. **Dreyfus**. I do not have those figures with me.

Dr. **Jones**. Not with me, I do not.

Senator **Wirth**. Perhaps you could submit that for the record. Could you do that, what that performance has been? A lot of the exploration and development in that area is obviously price sensitive.

Dr. **Lichtblau**. Yes.

[Subsequent to the hearing Dr. Dreyfus submitted the following:]

gas research institute

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DANIEL A. DREYFUS
Vice President,
Strategic Analysis & Energy Forecasting

March 16, 1987

The Honorable J. Bennett Johnston
United States Senate
136 SHOB
Washington, DC 20510-1801

Dear Mr. Chairman:

Enclosed for inclusion in the record is a copy of my letter of response to Senator Wirth's question to me during the March 11th hearing on the "World Oil Outlook."

With best wishes,

Daniel A. Dreyfus

Daniel A. Dreyfus

DAD/akl
Enclosure
cc: Betsy Moler

gas research institute

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Suite 730 North
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DANIEL A. DREYFUS
Vice President,
Strategic Analysis & Energy Forecasting

March 16, 1987

The Honorable Timothy E. Wirth
Senate Office Building
237 SROB
Washington, DC 20510-0602

Dear Senator Wirth:

Enclosed is a summary table of natural gas production for the first nine months of 1986. The 1986 production is compared to production for the comparable nine months in 1984 and 1985. The production data are taken from the Natural Gas Monthly of November 1986 and represent the marketed production (wet), that is, the volumes include the natural gas liquids that are extracted from the natural gas stream before the end-use consumption. (To get the dry natural gas production these volumes should be reduced about 4.5 percent.)

The data show that Colorado production has declined 11 percent for the first nine months of 1986 relative to the comparable periods in 1984 and 1985. Overall lower-48 gas production has declined about 3 percent in 1986 relative to 1985, although the decline since 1984 is 9 percent. It should be noted that Wyoming production is up 19 percent in 1986 relative to 1985.

If you have any further questions about these data, please call me.

With best wishes,

Daniel A. Dreyfus/akl

Daniel A. Dreyfus

DAD/akl
Enclosure

1986 Gas Production Trends
(January to September)
(Bcf)

	1984	1985	1986
Lower-48 States	13430	12555	12205
Colorado	130	130	116
Utah	55	61	48
Wyoming	386	306	363
Montana	37	38	34
New Mexico	688	680	524
Total (Rocky Mountains)	1521	1449	1342

Senator WIRTH. When you look at that drop in production of 10 percent how much of the domestic production would be brought back on line with a higher price? And how much of that, like much of the stripper production, has been lost? This is not just the Overthrust Belt, but the lower 48 over all.

Dr. LICHTBLAU. Well, I think the bulk of the decline is due to lessened drilling. So the reserves are not necessarily lost. Some of it is due to shut-in wells, stripper wells; some of these stripper wells may not come back; some of the other wells that have been shut in may also not come back. So there is a certain amount of this production decline that is lost, but I think the bulk of it is a decline in drilling new wells.

If these same wells are drilled two years from now, that production will come out. So it is not necessarily lost, provided you still have a service industry that can perform the drilling.

Senator WIRTH. I have heard the figure used that we have lost maybe as much as a million barrels a day in terms of stripper production that cannot be brought back again.

Dr. LICHTBLAU. How much?

Senator WIRTH. More than a million barrels a day. That seems to me to be a very, very high number.

Dr. LICHTBLAU. So far? No, that is impossible, because the total stripper well production is about 1.3 million barrels a day, and we have not shut in the majority of our stripper wells.

Senator WIRTH. What is your estimate of how much production has been lost that, even if we had a robust service industry, would not be able to be brought back again? Do you have any sense of that?

Dr. LICHTBLAU. I do not have a figure on that. I would say that well over half—well over half—of the decline we saw last year is not permanently lost.

Senator WIRTH. Well over half is not permanently lost?

Dr. LICHTBLAU. Yes.

Senator WIRTH. So if last year's decline was 700,000 barrels——

Dr. LICHTBLAU. That was from the beginning to the end of the year, not an average over the year. That 700,000 barrels is where you take the first quarter versus the fourth quarter of 1986. Within the year there was that decline. If you look at it on a year-to-year basis, the decline is much less, 1985 versus 1986 the decline may be on the order of 400,000 barrels per day, the annual average decline. So it depends on how you measure it.

It may be from the point of view of how the price reduction impacted production. I think it is more interesting to look at what happened during the year from the beginning when prices were still high to the end.

Senator WIRTH. Is it a general rule of thumb that of the lost production, less than 50 percent of that is permanently lost?

Dr. LICHTBLAU. Oh, yes. The bulk of it would not be permanent.

Senator WIRTH. How much of the lost production is stripper production?

Dr. LICHTBLAU. I do not have any figures on that. I think that DOE had issued some preliminary estimates, and I think they are in the maybe 300,000 to 400,000 barrels per day range.

Senator WIRTH. Do you have any idea of that, Mr. Jones?

Dr. LICHTBLAU. But even all the stripper wells of course are not necessarily plugged in permanently. Some of them are just shut down and can be reopened again.

Dr. JONES. Out of about 300,000 barrels per day of lost stripper production, about 200,000 to 240,000 is probably lost for good.

Senator WIRTH. Out of about 300,000 barrels a day of lost stripper production?

Dr. JONES. About 240,000——

Senator WIRTH. This is against the 700,000 figure that Mr. Lichtblau used?

Dr. JONES. Over the past 12 months.

Senator WIRTH. But the 300,000 barrels per day is lost?

Dr. JONES. You are not going to go back in and drill up those wells at any price less than $25 a well. You are just not going to do it.

Senator WIRTH. So we have lost a quarter of a million barrels a day.

Dr. JONES. Yes, it is gone for good.

Senator WIRTH. Permanently.

Dr. JONES. As far as most oil people are concerned, yes.

Senator WIRTH. And that is relatively inexpensive to get compared to the alternative of going out and finding new——

Dr. JONES. Inexpensive to get?

Senator WIRTH. No, relatively inexpensive. If we had maintained that production, that would have been relatively inexpensive compared to what the cost would be to go out and replace that domestically. Correct?

Dr. JONES. Well, it was taken out of production because the cost of gathering it and getting it to a distribution point was so high. I mean, those guys go around in flatbed trucks and barrels and literally gather a barrel at a time, in many cases. That is very expensive to do. But when you shut those wells in, those wells congeal like jello downhole and it is very expensive to go back in.

Senator WIRTH. I understand that. The thrust of that question is that even as difficult as that oil is, and as inefficient as the production may be, it is to produce still cheaper than the cost of going out and replacing that if we were to do that in terms of domestic production. Is that right?

Dr. JONES. In today's situation, yes, that is probably true.

Senator WIRTH. Let me ask you about incentives for further production. There has been some discussion here today about an oil import fee. You have touched upon a little bit. There was also some discussion of having a gasoline tax, or some kind of a balance between an import fee and a gasoline tax.

Is there any production incentive that comes out of having a gasoline tax?

Dr. LICHTBLAU. Not unless you channel it into the producing sector. Otherwise, it is just a tax on gasoline. Unless it is a very high tax, you will not even have any impact on gasoline consumption. But of course a penny a gallon is a billion dollars, roughly. So a relatively small increase in the gasoline tax could do a lot.

If for instance you wanted to have a floor price and you did not want to have that floor price established by an import fee, you could have a floor price that is financed out of a gasoline tax.

Senator WIRTH. The average price of gasoline is now a little less than a dollar a gallon?

Dr. LICHTBLAU. Yes.

Senator WIRTH. And at one point we were at $1.30. Is that not right?

Dr. LICHTBLAU. Pardon me?

Senator WIRTH. At one point, we were at $1.30, were we not, or a little more?

Dr. LICHTBLAU. Yes, in 1981-1982.

Senator WIRTH. So if we had just maintained a floor at that particular level, there probably would have been a significant conservation effect?

Dr. LICHTBLAU. Well, you would have more conservation in gasoline consumption, but it would be at a very high cost to the consumer. But I was talking about a gasoline tax that could possibly be used——

Senator WIRTH. I understand.

Dr. LICHTBLAU [continuing]. To support a floor price.

Senator WIRTH Let me ask you a final question. Some of you have alluded to the belief that incentives on the tax side may be more effective. This is what you are getting to, Mr. Lichtblau. That would be more effective than some kind of an import fee in terms of stimulating production? Could you expand on that?

Dr. LICHTBLAU. Well, the advantage of a tax is of course that it does not raise the price. That is one of the major problems with an import fee. It raises the price. The other advantage of a tax is that you make it zeroing in directly on where it is supposed to have a stimulatory effect—namely, on new production. An import fee is given to everybody, including all production that would continue to flow even without the import fee, and much of it would.

Therefore, you have a substantial amount of additional cash that may not, or may be reinvested. If you directly put it into the exploration area through a tax incentive, then only if somebody actually drills another well would he benefit from that incentive, not for any other reason. So it is more directly focused on the incentive that is necessary to get additional wells drilled.

Senator WIRTH. Mr. Jones, or Mr. Dreyfus, do you have comments on an import fee, gasoline tax, or some kind of other tax incentive?

Dr. DREYFUS. Well, I already commented on the import fee. I do not see the gasoline tax as an energy policy. Fundamentally, gasoline is one place where oil has no competitor. So when you tax gasoline, you do not provide any incentive to make more gasoline; you do not provide any incentive to dig more coal, or produce more gas, or anything. The only conceivable energy impact it would have is whatever elasticity, a penny a gallon or two cents a gallon might have on driving, which I would suggest is probably none at all.

We are not really inefficient in vehicles anymore, and there are some built-in efficiencies there. So I do not see the gasoline tax as having any relevance to this at all unless you use it to fill SPRO or to somehow subsidize something else somewhere else.

What you do with it would be the energy policy, not the tax itself.

Dr. JONES. We tend to concur. In fact, if you had a target of say $1.30 a gallon as what you wanted to achieve in order to conserve gasoline use, we would argue that within short order that tax would be placed upon a smaller gasoline price. That is, an increase in price to $1.30 would choke off enough demand so it would settle into the $1.15 to $1.20 range. So if you are targeting an end-use price, you would have to be constantly increasing your tax.

In any case, that is a revenue-raising device, not an oil producing device. The one set of incentives that I mentioned would be to think about rewarding people who do a good job of adding oil to the reserve base. The oil industry, having been in it for several years, is a naturally competitive industry. You do not know who the winners are going to be when you start the year, but if everybody is on a level playing field and competing, an incentive to reward people through tax breaks or whatever mechanism for exceeding some quota on adding reserves would probably stimulate the fool out of the drilling industry and give the industry a shot, and America a shot at finding additional hydrocarbons.

Senator WIRTH. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Nickles.

Senator NICKLES. Mr. Chairman, thank you very much.

To our panelists, thank you. I have been kind of interested in hearing each of your opinions. All of you have said our dependency on imports is going to increase and will continue to increase under almost any price scenario; that domestic production will continue to decline under almost any price scenario, so we are becoming more and more dependent on imports.

Last month we were importing 37-point-something, and in January it was 38.2. When do you project that we will cross that 50 percent threshold of imports, your guesstimate?

Dr. LICHTBLAU. I think in the early to mid-nineteen—well, I would say in the mid-1990s, I would think.

Senator NICKLES. The mid-1990s?

Dr. LICHTBLAU. Fifty percent.

Senator NICKLES. Do you agree with that, Mr. Jones?

Dr. JONES. No, I think a few years sooner than that. I would say it will be there easily by 1992, maybe even sooner.

Senator NICKLES. Mr. Dreyfus, you mentioned something distant in the 1990s, as well.

Dr. DREYFUS. Later.

Senator NICKLES. I would just make the comment, and this is on the record, that I think your guess in the mid-1990s is well off. I think you will be looking a lot closer to 1990. Any comment?

Dr. LICHTBLAU. It is possible, of course, but unless you assume a very rapid and further decline in the domestic production, I am not sure that is going to be the case, if you assume that prices will increase somewhat in the foreseeable future.

Senator NICKLES. Well, let me ask that question, because I heard a lot of discussion. Senator Wirth brought it up. You know, you mentioned the 750,000 barrel per day reduction, and I think Mr. Jones, and both of you mentioned the fact that, well, the average between 1985 and 1986 was only 300,000 to 400,000, but the facts are that in the last month or so we have been producing 8.3 million barrels per day. You do not see that going back up to 8.6, do you?

Dr. LICHTBLAU. No.

Senator NICKLES. Under any scenario.

Dr. LICHTBLAU. No.

Senator NICKLES. So we had a reduction in the last year of 750,000 barrels per day. I think I heard both of you say, or make the comments that you thought that next year under our present price scenario of around 18, that you would see a further reduction or a decline of probably 300,000 to 400,000 barrels per day. Did I hear that?

Dr. LICHTBLAU. For 1987.

Senator NICKLES. Yes. I hope the decline is only that amount. I will just tell you that we have running today, as of March 2, 801 rigs, which is half of what we had running in 1986. So if we only have a reduction of 400,000 barrels per day, I think that is an optimistic assumption, because we are not replacing, and we still have a lot of marginal wells that are being shut in. You have depletion. So I would say that it would be optimistic that we would still be at 7.9 a year from now. We will see. We are going to be here a year from now, and we will take a look at it, but I think your scenario that we will be importing 50 percent by the mid-1990s is overly optimistic.

Dr. LICHTBLAU. It may be. When I say the mid-1990s, I do not necessarily mean 1995. I mean, period, you know from 1993 on up towards 1996, that period. The average in 1986 was 33 percent. So that 37 percent that you are saying may not be the average—is unlikely to be the average for 1987.

Senator NICKLES. Well, let us get into that. I have the same problem with DOE. DOE keeps making the same statements that, well, we are at 33 percent. The National Petroleum Council says we are at 33 percent. But the facts are we are at 38 percent.

Dr. LICHTBLAU. At the moment.

Senator NICKLES At the moment. And I think we will continue to be, because we are not going to have that production go from 8.3 to 8.6. We are not going to be producing any more than that 8.3 at the most per day.

Dr. LICHTBLAU. Demand fluctuates seasonally, so our import level in the beginning of the year could be higher than it is going to be for the average of the year. Therefore, it is possible—it is likely that the average will be below the 38 percent average for 1987.

But I mean I am not at all disputing the fact that the import level in 1987 is going to be significantly higher than in 1986. I just do not know if it will go from 33 to 38 percent, which would require a very substantial increase in imports in a single year. But the trend is clearly upward.

Senator NICKLES. Well, we went from 27 to 33 to 38, and my suggestion to you is that since we are going to be producing probably at least 400,000 barrels less on a daily basis, that that increase will continue. I think that by the end of the year we will be through the 40 percent barrier. Again, I do not know, but it is on the record and we will find out.

I think a lot of the projections have just grossly understated our increasing dependence on imports. One could argue what does that mean, and how vulnerable will we be, and what will OPEC do, and what will happen on the price side, but I do not think there is really any question, any question, on the debate that we are becoming so very dependent on, in my opinion, unreliable sources.

Then we get into the issue of what should we do? I think I heard most of the panel—correct me if I am wrong—but all the panel say you thought an import fee would be a bad idea?

Dr. LICHTBLAU. Well, I do not know if it is a bad idea. I think there are other ideas that may be preferable.

Senator NICKLES. Let me ask you a question. I think when most people think of import fee, they think well we are going to have a surcharge on imports. We heard some discussion by the Chairman and others, and some of us are supporting the idea or the concept of a floor for stabilization, and maybe to encourage again some stabilization, and to prevent if OPEC or whatever, their fluctuations where they have gyrated the prices all the way from last year we were looking at prices of $28 down to $7-and-something at one time.

Do you think it would make sense, since those are governments manipulating prices, fluctuating prices, make sense for our government at some level, and I am going to say $18 to $20, something in that range, to have a floor price to lend some stability to this industry?

Dr. LICHTBLAU. I think a floor price might make some sense at a certain scenario, but I am not sure you have to do it by an import fee. There are other ways of assuring a floor price, like in the domestic agricultural industry. You could simply guarantee a floor price. If the price goes below that, the industry could receive payments up to that floor price level.

Where do you get the money from? You would have to collect it somehow. For instance, you could do it by a gasoline tax then, a few cents a gallon would bring up several billion dollars. I would like to see the floor price limited, if there is one, to new production rather than existing.

Senator NICKLES. Well, wait a minute. Some of us are trying to keep to where we do not prematurely abandon a lot of those wells, that if we walk away from them we would not achieve that oil. And to get to the real question—and this is what I would like for you to address—if we did, say, peg a price to $18, and basically if the price is already $18 it would not cost anything; if prices went down to $16 there would be a $2 fee, et cetera. Would that not give great incentive to the OPEC cartel that is setting world prices to try and maintain that level?

Dr. LICHTBLAU. Probably. There is a good chance that OPEC would then use this. It depends how low you go. If you have an $18 floor price, I think OPEC would not be all that delighted. If you have a $22, $23 price, it is possible that OPEC would use this as a target saying, well, the United States, the world's biggest importer, wants a $22 price, so we do we not try to make this our target. Whether they will succeed or not is another question, because they are still under the same pressure of surplus capacity that they have now. But they may try to move there.

But an $18 price would of course assure investors that they can count on $18. Right now, an $18 price is not a safe price. To make an investment decision and the price is $18, you cannot say I make my decision on that basis because it may not stay there. In fact, most investors probably are using maybe $15 for investment purposes.

Senator NICKLES. I agree with you 100 percent. That is the reason why we are looking at this floor price instead of just a $5 add-on or something else.

One final comment. I think I heard support from the entire panel for filling the Strategic Petroleum Reserve to give us a little insurance against the cutoff or shortgage of imports?

Dr. LICHTBLAU. Yes.

Dr. JONES. Yes.

Dr. DREYFUS. Yes.

Senator NICKLES. Would it not make sense to have a small fee on imports to a user's fee, in effect, to pay for the filling of SPRO?

Dr. LICHTBLAU. Like 30 cents a barrel?

Senator NICKLES. 30 cents a barrel, and you can fill SPRO at 100,000 barrels a day. Would each of you agree with that?

Dr. LICHTBLAU. I would prefer to see it done through a motor fuel tax. It would not have any impact on prices. It would not create some international problems in terms of beginning to put on an import fee, which, you know, it was a very, very small, almost invisible, import fee that was put in when a differential was established between some domestic fees and foreign fees that caused a lot of problems internationally. I am not sure whether you could not do the same thing with a half a cent a gallon gasoline tax, or something like that, which you have about the same effect and it would not be visible at all as far as the consumer is concerned.

But the idea of collecting a tax to build up the Strategic Petroleum Reserve I think is a very sound one, and it is highly important that we go in that direction.

Senator NICKLES. Mr. Chairman, thank you very much.

The CHAIRMAN. Senator Ford.

Senator FORD. Mr. Chairman, most of my questions, as I have listened, have been answered.

Let me ask a couple of questions right quickly of the panel. Each can answer in his own way. As we increase our dependency and it continues to move in, as I see it, the wrong direction, how serious is our situation as it relates to another embargo? How serious is the lack of the filling of SPRO, increasing that? What do you see on the horizon as we move to the 50 percent of imports, and even further? We are looking in four years to be beyond or at 50 percent, somewhere in that range at 50 percent. And I think it was 32 percent when we had the embargo back in the early 1970s.

So we really are vulnerable now, in my opinion, and I am just a fellow sitting here listening to the experts, as the Chairman said. Would you all give me some idea about the dangers that we are facing out there with this high dependency on imports?

Dr. JONES. Let me try this one, Senator. We published a major study that basically said that by 1989 to 1990 a 2 million barrel per day interruption in global supplies of crude would push oil prices to $35 a barrel. Now that is an easy thing to say. What is more important is what is on the other side of that. That is how the country copes with it, and the implications involved.

The implications are immediate increases in inflation; immediate disruptions in relative wages, and so on and so forth, as we scramble to supply oil to a world market that needs additional oil.

In our scenarios, or our tests of the global system at that point in time, we actually turned on the Strategic Petroleum Reserve and, while it did have a dampening effect, it did not correct things overnight. It is no panacea for being prepared for the eventuality of much higher prices and disruptions.

The down side of much higher prices in the 1989, 1990, 1991 time frame is another cycle down in the industry, because of SPRO. Because of a rapid escalation in efforts to conserve energy and to substitute for oil, you have a rapid decline in price after a period of 9 to 12 months that puts you right back in the $10 to $12 range within 18 months.

Now the implications of all of that is a reignition and then a rapid deceleration of all the incentives to go back out and look for oil. It is another round of extreme volatility that tends to do more damage to the long term rather than help the long term. So that this oil price shock that the industry continues to look for, if it occurs as we think it will by the 1990-1991 time frame, will in the long pull have the implications of actually being a deterrent to long-term exploration.

Senator **Ford**. Dan?

Dr. **Dreyfus**. The Chairman asked a little while ago about confidence in projections. I think this is the critical aspect of it. We tend to make projections that will derive balances. We say, well, how much is out there, and how much does it have to cost to produce it, and how much will people use at that price, and then get a nice, smooth curve that says, well, at this point you will get $40 oil, and you will be using this much of it, and it will be being produced.

The things that always mess up the projections are the discontinuities that take place. Essentially the fundamentals are that two-thirds of the world's oil is in the Middle East. It is presided over by some governments that are unstable today, and will be unstable in that time frame. It is the cheapest oil, which means that any effort whatsoever, whether we are using oil or anything else, to overcome this dominance is much more costly. So in an economic sense people do not choose to do it.

We will be in an unstable situation, and the probability of an event will be very high because the number of influential actors are going to be even greater than they were in the 1970s. We are getting into a situation where several individual unstable countries can really mess this situation up and result in price fluctuations in the $20 range with immense impacts on everybody's economy.

The other aspect that frequently gets overlooked is that this oil situation is important because it represents a constraint on foreign policy options. It is not the economics of the thing so much. The economic pressures come and go and there are various ways to buy your way out of it. But fundamentally when you get into a situation where everything is on the ragged edge, you simply cannot exercise foreign policy the way you would like to. You get pushed into doing things that you would prefer not to do, or prevented from doing things that may be necessary.

As an example, I would just say to those of us who were around here in the middle 1970s, that we recently had the Libyan raid. Now, whether or not you consider that to be an appropriate response to anything, consider the possibility of even doing that in the middle 1970s. Consider the attitudes of the Japanese, and western Europe if we had thought about a raid on an oil-producing country in the late 1970s in the height of the energy crisis. It would not have been a viable option. It simply could not have been done.

This is where the critical situation is, the tremendous constraint it puts on foreign policy in that area which is an important area.

The CHAIRMAN. If the Senator would yield at that point, I recall very well when I met with our Secretary of Energy and urged him to fill the SPR at a faster rate, I was told that the Saudis did not want that and therefore we were not going to do it.

Dr. DREYFUS. I remember that well, too.

Senator FORD. They wanted us to use their oil. Doctor?

Dr. LICHTBLAU. Well, I think what Dr. Dreyfus just said is very important. I have in my paper one of the points why the higher import dependency is dangerous, because there is a geopolitical effect of this. It reduces our ability to make decisions, particularly in regard to our Middle East policy which is a very difficult policy anyway. And if we have to consider continually this higher rate of dependency, and the fact that the oil we get from there is irreplaceable at a certain level, it would clearly affect what we can do with freedom of action in the Middle East.

From that point of view, it is an undesirable situation. But it is not a short-term situation; it is a long-term dependency, and how to prevent that is another story. As far as the short term remedy is concerned, I still think while the Strategic Petroleum Reserve is not a panacea, I agree with that, it is a very, very important instrument, and I think the Administration's attitude of wanting to fill it at a very low rate, at half the rate at which it is being currently filled, is a mistake. Because the sooner we have 600 to 700 million barrels in place, the sooner we are in a position to face the possibility, and the less likely it is that anyone will ever again try an embargo tactic on us.

Because if we have that much oil in place, and for maybe half a year or longer we would not even be hurt by it, it is less likely to happen.

Senator FORD. Let me ask you then this other question that ties in behind some of the things we have been thinking about.

Should we continue to use conservation methods, or look at conservation—that is, automobiles, even with 10 million cars with increasing gasoline use based on large automobiles that are going to be built? Apparently our consumption of gasoline is not going to be increased very much. The increased consumption of gasoline, for instance, is because gasoline is under $1 and there is no restraint on its use. Shall we continue to be very careful about conservation? Or is it all right to find new uses and new ways of using oil?

Dr. DREYFUS. Well, I think that basically the biggest problem with the low oil prices is we had gone through a period here for about six or seven years when oil was being squeezed out of discretionary markets. If you look at the statistics of oil use over the last few years up till last year, while total world demand was going down, actually transportation uses of oil were going up.

The entire conservation was in the use of oil in stationary applications, which are inappropriate in this kind of a situation. The economics was taking care of that. We now have had a reverse in the last year in which oil use in stationary applications went way up. Power plant use of oil want up by something like 30 percent last year. So that reversal is very serious.

Because, again, we came into this past crisis with an immense dependency upon oil throughout the economy. I do not know any way you can get away from it in transportation because there is not any alternative under about $50 or $60 oil that makes any sense, and we will not have that kind of oil price in the near term.

But certainly anything that can be done to avoid a recommitment to oil-fired facilities outside of the transportaion area would be very helpful. If you look at the statistics, some very interesting things happened last year. We had an immense increase in the purchase of oil burners for homes. That had not happened in years. It went way up last year.

We had a big increase in the purchases of oil boilers for small industrial activity. That had not happened in years. So we have already seen at the smaller investment level a willingness to take a risk towards stable oil prices.

We will eventually see it in large industrial and electric utility uses—not just running existing plants, but building new plants. We will see it in the third world where the low initial costs of oil-burning equipment are helpful. We will see a recommitment to oil in uses that are not inherently oil uses, and you will see that below $18. So that is I think the critical factor.

Senator Ford. You see that as a danger, then?

Dr. Dreyfus. Oh, yes. That is what happened last year. We used to guess about it, but we had a laboratory test and it happened everywhere last year. That pushes the world oil demand way the hell up, and much more than you will get out of the elasticity in driving.

Senator Ford. Dr. Jones?

Dr. Jones. Yes. The current car park, or the fleet of cars that exist out there today as the older ones die off, of course the only option you have is to buy a car that gets 20 miles to the gallon or higher. So as far as further institutions of CAFE standards and so forth, I would recommend strongly against it.

As Mr. Dreyfus says, really at the margin the big users are industrial users, or commercial users of oil that have the capability to switch on and off. The one thing that you might want to encourage is the increased portfolio nature of energy burn in this country.

On the fringes, for example, of the gas transmission network the distribution companies are faced with very few choices as to options on fuel. If you look at Boston, that is a large metropolitan area, the percent of dual-fired capability users in the industrial sector is not that great. So that there are large regional discrepancies in this country in the flexibility with regard to energy use, and you could certainly go a long way toward rectifying that.

Dr. Lichtblau. Well, I think the idea of further conservation is of course a very good one. There is a cost attached to that, and that you have to consider. It is a little difficult to explain to the public that as the price of oil goes down you have to conserve more. The public would normally understand this kind of idea if the price went up. In 1979, 1980 I think this was accepted.

However, as Mr. Jones said, automobile efficiency is increasing. Therefore, the average use of gasoline is not rising even though mileage is going up very rapidly. We see a very slow increase in gasoline demand even with those 85 cent prices.

In the industrial sector, of course there is interfuels competition between oil and gas. It is strange that while you used much more oil in 1986, there is a substantial amount of gas that is shut in that could directly compete with this oil. So I think as oil prices have moved up again towards the $18 level, you see this being reversed. There is a very sharp increase in fuel oil demand in 1986 as a result of the price break. It is being reversed now.

Senator FORD. Do you have the concern that Dr. Dreyfus does that as we get into major utility burning and that sort of thing that we could be in somewhat of a—do you have the concern that he has that once we get into major utility burning and we are dependent on those sources, that at some point we could have some problems?

Dr. LICHTBLAU. We could in the 1990s. I do not see it happening in the next two or three years, but beyond that as our nuclear power stations are being leveled off because there is no additional construction and some of the very old ones are probably going to be dismantled, I think more oil and gas will be used at the margin to power these stations. Therefore, there will be more dependence on fossil fuels on oil and gas.

Oil and gas are interchangeable, so to that extent you could have a shortage in either of these two fuels if they are using the full amount.

Senator FORD. Thank you, very much.

The CHAIRMAN. Senator Domenici.

STATEMENT OF HON. PETE V. DOMENICI, A U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator DOMENICI. Mr. Chairman, I wanted to share with you and the Committee just one statement, and then I have about three questions.

As you remember, I went to your State with reference to some hearings on the state of the domestic industry. The principal recommendation as I recall it from the experts there, from the independents to the majors, to anyone in between, was an oil import fee. I will ask the panel a couple of questions about that in a minute.

But I had some extremely interesting testimony in New Mexico on a similar hearing that I thought I might share with the Committee. Halliburton Services, as you know, is one of the majors. They have had to go through an incredible cutback, like 40 or 50 percent, to stay alive, but they gave me this observation which was most interesting in terms of the real impact on the American economy of not drilling oil wells on other industries. Let me just read this one paragraph.

> The importance of drilling activity to other industries within the economy is not fully recognized. Our analysis,

Says he,

> indicates that an average on-shore well within the domestic U.S. uses about 45,000 tons of steel. If an average passenger automobile manufactured in the U.S. contains 2000 pounds of steel, then each well represents about 45 automobiles. The 40,000 wells that were not drilled in 1986 represent the same steel demand for 1.8 million cars. Thus, a steel market that was approximately equal to the auto production of the Ford Motor Company during 1986 was eliminated.

I think it is a rather interesting set of facts, and one of the reasons that some of us are saying there is a ripple effect to the shrinking of the American oil domestic industry that we think we understand with bank failures and unemployment, but it probably has a far larger GNP effect than most of us recognize.

The CHAIRMAN. I can tell you we have 14.7 percent official unemployment in Louisiana now. The actual unemployment is much higher than that, and that has a pretty good effect on taxes paid in my State.

Senator DOMENICI. I would also suggest, while it is beating a dead horse, that there is another way to increase America's nondependence in terms of years to come. The Synthetic Fuels Corporation was one of those. I am pleased to see Dan here. I do not think anyone worked harder at trying to put something together that would work. But it does appear to this Senator that if you have oil shale reserves out there, that the one thing which would stabilize the activities of a cartel would be for them to understand that the United States was not ultimately as dependent upon crude oil as they think, and we have one way to do it now. We SPRO it up and put it in the ground.

I do not support SPRO as much as other people because I have not seen any game plan that says when the event occurs that we need it, that we are even going to come close to figuring out a way to get it out of there and distribute it in a manner that will minimize the lines we saw, and the incredible prices that we saw, unless it be that the military uses it and all other military uses go to the domestic market. I see no other plan around.

We have asked them for the plan. I am not even convinced, to tell you the truth, that we will get it out of there in an orderly manner, number one. And I am surely not convinced that we know how to distribute it. And secondly, I am not sure we know at all how to make it fungible within the overall marketplace where a shortage exists. Nonetheless, it is neat to have, and I do hope that——

[Laughter.]

Senator DOMENICI. And when you are from an oil-producing State, it is surely nice to say you want to buy more, not less. And if it is having an impact on the cartel in terms of their thinking that a million barrel cutoff cannot do what it might have done before, why I am glad they believe it, if they do.

Having said that, Dr. Dreyfus, first, let me welcome you. It is really great to have you sitting there. I think you are much less inhibited, perhaps, than you were when you had the staff the likes of this Committee, and I think that is good.

Dr. DREYFUS. Much less effective, as well.

Senator **Domenici**. Very good.

I understand that GRI has recently done some work on enhancing gas production in old gas wells in Texas. If I read it right, the results are dramatic. Simple, but dramatic. They used old logs, went back down through the logging, and then experimented at various levels with new fracturing techniques that the logging data revealed might be opportunistic, and lo and behold they found that old wells on a random sample—it is nothing gigantic yet—that there may be as much production left with some reasonable fracturing than what we took out of some of these wells.

This could reopen a whole field, and I mean that literally. Could you just comment on that briefly?

Dr. **Dreyfus**. We do believe that the best opportunities for extending the resource base in gas lie in essentially getting more production out of existing wells and new wells in discovered fields than was initially thought possible. And in utilizing the tighter resources, the unconventional resources that are associated with existing fields.

There has been some work done on oil which we think is equally applicable to gas. When they thought they got 90 percent of the gas, they really only got 60 percent recovery. The reservoirs are not as uniform and homogeneous as the engineering that was done over the years supposed, and therefore there are opportunities to go in and get more gas.

There also are in some areas tight formations that were bypassed in the initial work and that are there behind the pipe, behind the casing, and that can be exploited.

The reason that becomes attractive in the current environment is because in the current environment initial capital investment means more than the eventual cost. If you can avoid the high risk and the high cost of exploration, which is something like half the total cost of production of gas, then you can get in, you can minimize the amount of capital that is necessary to do some work, and get a rapid cash flow out of it. It is just the kind of investment that will be attractive as the industry starts to build up with a touchy investment community that has been burned pretty bad. So we are working on the technologies required.

We have not done much work on the enhanced recovery, because up until just recently we stayed with tight formations, watered out reservoirs, and coal seams. But now we are in fact starting to look at re-engineering, the ability to do logging through the casing which is not a conventional practice, re-evaluation of old logs, and that sort of work, which are the necessary techniques to go back in and get more production.

Senator **Domenici**. Again, this is directed at you, Mr. Dreyfus. You know when you were working on natural gas issues during the development of the Natural Gas Policy Act and even before that, one of the real marketplace phenomenon, because we had such regulated prices as you recall, was the take-or-pay notion which meant that a pipeline committed to take and to pay, and thus created for itself and ultimately its users on the other end a reserve that was credible and that was considered to be very good business to attempt to have as much of that reserve that you could count on as possible.

It is amazing. We have in a very short period of time had a total turnaround. We now have, I think Mr. Chairman you have confirmed that maybe we have as much as a $13 billion backlog of take-or-pay wherein the takeor is not paying and refuses to and could not pay or they would go bankrupt across the country. One major pipeline has as much as $4 billion in take-or-pay obligations that they are not going to pay.

Part of that dilemma, part of it, is because FERC has removed the responsibility of the gas distribution companies to pay what are called demand charges which spread this risk, this producer risk.

Did I read anything in your statement indicating that you thought maybe FERC should revisit the way it spreads producer risk?

Dr. DREYFUS. I hope you did not read anything in my statement that said that, because that is not basically my arena. I think that the situation you refer to, however, is that pre-deregulation we had a set of institutions that provided an inventory of gas established from a franchise service area all the way back to a take-or-pay contract back at the wellhead. It was a system by which the cost of drilling a well that was not yet needed and maintaining a portfolio of gas that was not yet required, or that was only required in January, was taken care of through the regulatory system.

Now that system is gone. That system has been totally dismantled, and we have had experience since it was dismantled only in a surplus situation. We have never tried out the free market approach to maintaining gas reliability in anything but a surplus market. The deregulation took place about the time the bubble came along.

It is pretty easy to postulate a set of free market arrangements that will do the same thing. That is not beyond comprehension, but it is not yet clear how it is going to happen. As we come out of the bubble, it is going to be very important that the policy makers and the industry—all three segments of the industry—and the users, are conscious of this. Because there are some things that have to be done and paid for. There are inventory costs and insurance costs, and new institutions have to grow up to pay for those.

Senator DOMENICI. Well, I will tell you, Mr. Dreyfus, coming from New Mexico, you just cannot imagine how much we feel like a colony of California. I tell you, it is not a very good feeling, and I tell you I love the concept of "These United States" and "interstate commerce," but I really cannot believe that they are going to get the cake and eat it too throughout this whole energy crisis.

When the problem comes back, we are going to see them screaming for "their share" and for "guaranteed deliveries," and I hope we are so deregulated that we can decide whether we want to sell them any or not. I mean, what they have done to production in a State like mine, in my opinion, is totally unjustified. Cancel any kind of contract that has any longevity, and say anybody that is buying on long-term contracts, we are not interested; we are interested in no more than 90 days. You send us the best price for those 90 days, and we do not care about a 91st day. And here goes the backup back up the pipeline where thousands and thousands of people developed natural gas in a both regulated and deregulated market to serve them, shipped it at 28 cents during all those years, and were obligated to under take-or-pay contracts and the like so they could have the cheapest gas going. I wish no evil on anyone. That is a marvelous State, and they apparently have a marvelous commission regulating the activities of their distribution companies and the prices, but to me that is pretty short-sighted from the standpoint of sharing some of the risk involved in maintaining these reserves. It is just obvious to me.

My last question to you is, it has been said of all of you that you do not favor the oil import fee, $4, $5, variable rate, and you have given us your preferences. The difficulty I have is that I do not believe we can. It is difficult to pass an import fee, even of the type the Chairman and I support. I think it is more difficult to pass a mandated floor. I believe the import fee is easier to sell from the floor from the standpoint of those around here who are concerned about something completely different than we are. That is number one.

Number two, I understand some would prefer changing the tax code so as to create some incentives with reference to production. I think you are marvelous theoreticians. I think it is great. On the other hand, we did our very best in the new tax law to preserve, I guess I will give a rough cut, 85 percent of what we had—and that was not easy.

So I would conclude that unless somebody comes up with something absolutely marvelous that I have not heard, that that would be tough to pass, the incentives we are talking about. Somebody else suggests a gasoline tax, and then use that to maintain the floor. It appears to me a gasoline tax is hard enough to pass on its own, much less to in any way tie it into the industry, the domestic industry, unless you have got enough people going on something to help the industry and then you pooled it.

So in light of that, might I ask, if my assumption is correct, that of the four that I have mentioned the easiest one to pass might be an import fee, would you conclude that it is better to do that than nothing? Any of you.

Dr. **Dreyfus**. Let me lead off, because several people have said that we all agreed there should not be an import fee. I do not remember saying that I was against an import fee. What I said was the import fee rests upon certain assumptions.

The first assumption is that if you are going to support U.S. prices to $25, that the world price is going to get back to $25 or more in some reasonable length of time, because the import fee that supports U.S. production artificially for 20 years is a loser. It clearly is an economic loser.

If on the other hand if you think you are going to dismantle the U.S. production capability and then the price is going to go back up to $25 or above and you are going to remobilize, which is always an inefficient situation, there can be a pretty good argument that not doing that will save you money in the short and the long term. Therefore, supporting the U.S. production for some reasonable period of years is a good idea.

If you intend to do that, then you either have to first of all have to have faith that the world price will be $25 soon—in two or three years, not ten or twenty years: $25, I think, is kind of a minimum, because the threshold of new investment will not take place at $18 that you are really trying to get. The difference in production in the U.S. will not be that great. Stabilizing the price at $18 will make a big difference compared to decisions that work out at $10, do not mistake me, but to get a large amount of new work, new exploration the price must be at $25 and the producers have to get the money. You cannot bleed it off through some kind of a windfall profits tax or something and use it somewhere else, because obviously the investor that drills the well has got to get the $25. He has got to see the $25.

And it has to hold up when the world price goes down. I think the very imposition of the fee will result in the world price going down. If you did it today, you would put another million barrels a day into the world trade next year, because U.S. demand would go down a half a million barrels, U.S. production would go up a half a million barrels, imports would go down a million barrels, and that is the same as OPEC cheating a million barrels.

So that the $17 or $18 price we have today would be likely to go down to $14, and you would have to hang tough then with the $25 because if you turn that off and on it gets to look a lot like the situation you have without it.

The CHAIRMAN. Would the Senator yield? Could I interrupt at that point?

Senator DOMENICI. Certainly.

The CHAIRMAN. You are saying that our trade balance would be cured by the equivalent of a million barrels a day?

Dr. DREYFUS. If you supported U.S. prices at $25—and I would defer to my colleagues who spend more time on oil than I do—I think you would change the picture next year, you would reduce U.S. imports from whatever they were going to be by about a million barrels a day next year. If you could guarantee the investor in the production side in the U.S. that he could get $25, yes.

Now that million barrels will show up in the rest of the world trade, which will destabilize this OPEC agreement and probably mean that the price next year will be $2, or $3, or $4 lower in the world than it would have been if we did not do it. So that the difference between $18 and $25 is fine, but if it goes down to $14 you still have to hang in there. You have to have a fairly high price. You have to stick with it. And you have to let it get through to the producer.

If that happens, you will see a difference in the production in the U.S. Now the question is: How long can you stand to do that? If it is a matter of getting over an interlude of low prices and the world price is going to be back up there, I think it makes a great deal of sense.

On the other hand, if as some people believe you are not going to see $25 in the world until the year 2000, then you are going to go broke trying to sustain this uneconomic production that long.

That is the way I see it. I myself think that price is going up pretty fast and pretty soon, but there is going to be a period of time while it tightens up when you are going to have a hard time selling that to people who are paying $25 when the Japanese are paying $14.

Dr. JONES. The work that we have done suggests that there is no way that the market is going to deliver stable prices above $20 a barrel for some years. So that if the objective is to achieve a price above $20 a barrel in order to maintain drilling activities, and so on and so forth, then you are going to have to impose a fee of some sort.

You have to decide up front what the objective is, and if that is the objective then the import fee is the quickest solution to that issue. The market will not give it to you. There is no way.

Dr. LICHTBLAU. Well, I cannot comment on the political aspects of an import fee because that is not my field. I understand all of these things are difficult. You suggested, Senator, that an import fee was less difficult than some of the other measures. That may be so, but from the point of view of what is more desirable, I think these other measures would be preferable.

That does not mean that they are easier to pass, but I think if you had a tax incentive, for instance, you would not have to face the problem of raising prices and making the U.S. energy costs higher than those of foreign nations and all these other factors.

If you cannot pass these other measures, and you can only pass an import fee, then you have to consider that versus doing nothing. But I do not know that there is very much political sentiment now to pass an import fee, either.

Senator DOMENICI. I understand. You know, just to put into perspective how tough it is to do anything with the tax code versus the oil and gas industry of this country, it is not so easy to pass a repeal of the windfall profits tax, if you can imagine. That is not easy.

Dr. LICHTBLAU. Which is amazing to me.

Senator DOMENICI. I understand, but I am giving you that as a part of the perspective of what we are confronted with.

Dan, it seems to me that your rationale, that I do not have any difficulty with it; it just appears to me that the notion that the price can drop well below these numbers that we are talking about, the $18 or the $22 or the $25, it just seems to me that if you put an American import fee in between $4 or $5, you literally are asking a bunch of Shieks and whoever runs the Ayatollah's business to throw that much money away in the process of dropping the price. You know, I think they all have a little bit of sense.

So I think it is an inhibitor to precipitously dropping the price, because to the extent that that is in there it is that much of a buffer, and so it serves some purpose it seems like.

Dr. DREYFUS. In the final analysis. But initially it will make it very difficult for them to—well, the quota has to go down. The quota that they have, that we are arguing about whether they can maintain today, would have to go down by a million barrels in order to sustain the price in the first couple of years.

Now if we are all right about our projections, by 1990 they do not have that problem any more because the overall demand situation will have taken care of it, and the falloff of the North Sea, and that sort of thing.

Senator DOMENICI. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Murkowski.

STATEMENT OF HON. FRANK H. MURKOWSKI, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman.

Mr. Chairman, I commend you for scheduling this second in a series of oversight hearings that this Committee will hold on the world oil situation.

This hearing occurs at a particularly appropriate time. Since the Committee first heard testimony on this matter about six weeks ago, there have been several significant developments. Secretary of Interior Don Hodel has publicly declared that we are rapidly approaching another energy crisis. The National Petroleum Council has recently released a study which predicts that the United States will be fifty percent dependent on imported oil by 1995. And the Department of Energy will release next week a study on the implications of oil imports on national security. It is widely rumored that this report will also express deep concern over the energy security position of this country.

On the other hand, there are people who do not necessarily agree with these predictions. For example, Professor Kanovsky of Israel's Ilan University believes that the OPEC Nation's dire need for cash makes a long-term interruption of crude oil supplies unlikely.

It is clear, Mr. Chairman, that we have a wide range of opinion on the seriousness of the current oil situation. Yet, that disagreement is nothing compared to the diverse ideas on what ought to be done to address the situation.

For my part, I believe the appropriate response is multi-faceted. We need to take immediate steps to determine the extent of our domestic reserves. This means, first and foremost, leasing the Coastal Plain of the Arctic National Wildlife Refuge—the most promising unexplored oil and gas prospect in North America. We must also adopt policies, such as an oil import fee, which assure the survival of our domestic oil industry. And we need to continue to promote the development of alternative sources of energy, including conservation measures.

I look forward to exploring with the witnesses here today their views of these issues.

It is too bad that all our colleagues cannot participate in your projections, gentlemen. I was not here to hear all of the testimony, but I assume you are in general agreement that the anticipated increase in exports, whether it be the Department of Energy figures or your own figures, indicate that somewhere between 1995 and thereabouts, the end of the century, we will be looking at substntially increased imports in the mid-50s or low 60s, and that seems to have been reinforced by virtually every set of experts that you can come by.

I noticed, Dr. Lichtblau, in your testimony in particular you indicated some recommendations. Your first recommendation was protect against the impact of short-term foreign disruption and strong, aggressive programs, no other funds are available.

Secondly, the government's role, which I thought was appropriate, stay out of industry's way. Windfall profits tax should be done away with.

I am wondering, though, on the windfall profits tax as you indicate your recommendations on incentives, production tax incentives, I guess including depletion allowance?

Dr. LICHTBLAU. Yes.

Senator MURKOWSKI. Is there a way to, assuming that the price gets back up so there is an application of the windfall profits tax that could be directed as an incentive to encourage exploration of domestic production, increased domestic production? Is that another way of redirecting that in a more responsive way to address your concerns that we should have some incentives?

Dr. LICHTBLAU. The windfall profits tax is a negative, so if you remove it you remove a negative. Is your idea to perhaps leave the windfall profits tax on existing production and remove it from new production? Is that what you have in mind, Senator?

Senator MURKOWSKI. Well, my question is more to use the windfall profits tax as an incentive for encouraging—in other words, it would not be a windfall profits to the Federal Government, it would be a windfall in the sense of encouraging some kind of a reinvestment back so the industry would have the incentive.

Dr. LICHTBLAU. I see. Well, that would be along the lines of any kind of incentive to domestic exploration and development drilling. And whether it is done through a direct tax such as increasing the depreciation allowance, or reversing the windfall profits tax by paying out money for certain activities, it has the same basic impact. I think it would be a desirable thing to do, however you achieve it, because it would create incentives without raising costs for the consumer, without making the U.S. less competitive internationally and having all the other negative effects of raising energy costs not only for oil but for all other energy sources. I see this as one of the basic problems with an import fee.

It would not be the case with any of these tax incentives. If you want to include a reverse windfall profits tax among it, I think it may be a very good idea. I just do not know, mechanically, how it would work. It would have to come from somewhere. Perhaps the windfall profits tax that has been accumulated all these years could be used for that, but obviously it is no longer there, it has been spent.

Senator MURKOWSKI. I do not want to take too much time. I have one more question generally, Mr. Chairman.

With regard to the suggestion that the government stay out of industry's way, I am wondering if there is not another side to that, to encourage the government to initiate a climate, if you will, to urge continued exploration in our own domestic areas where we have reason to believe that there might be reserves. We have got the environmental questions of course of the Santa Barbara general area, we have got the issue of ANWR, the Arctic National Wildlife Reserve, and the opening up of the Coastal Plain, but of which have substantive potential reserves but we seem to be our own worst enemy. Of course being from Alaska, our interest in the Coastal Plain-ANWR issue is a significant one.

Have you got any suggestions that have not already been tried as to how we can convince those that oppose exploration, as opposed to production, the fact that this is just not only a matter of good economic planning but it almost has to be mandated from the reality that we are not going to be able to develop alternative energy sources at economically viable prices, and we just have no other alternative other than to be held hostage, if you will, again by the Mideast.

Dr. LICHTBLAU. I find the arguments against drilling in the ANWR and other areas so totally unconvincing that I do not know whether they have any case at all. I think it is an automatic thing. There is no question in my mind that you should open up these areas as soon as possible, because we are talking about a ten-year lead time anyway.

Senator MURKOWSKI. That is correct, a ten-year lead time. So that puts us into the end of the century.

Dr. LICHTBLAU. Into the 1990s. So the earlier we do it, we should have done it several years ago in fact. I do not see that there is any valid argument against doing it, particularly as you mentioned we are talking about exploration at this stage and not full-scale production.

But if the same argument had applied to Prudhoe Bay, we would be 2 million barrels, 1.8 million barrels a day less well off. In fact, the entire increase in U.S. oil production from 1977 on was due to Alaska.

Senator MURKOWSKI. What would you suggest the price of crude oil would be today if Prudhoe Bay had not come in?

Dr. LICHTBLAU. Well, right now it might be at the same level, but it certainly would not have—it probably would not have gone up to the level it did in 1979–80.

Senator MURKOWSKI. But our trade imbalance, as Senator Johnston pointed out in his opening statement, would probably not be $25 billion, it would be $35 billion.

Dr. LICHTBLAU. That is right.

Senator MURKOWSKI. As a consequence, we would be dependent upon another 2 million barrels. Instead of importing about 4, we would be importing about 6.

Dr. LICHTBLAU. Right.

Senator MURKOWSKI. And that, I would like the record to show, was an issue very much like ANWR.

Dr. LICHTBLAU. Very much.

Senator MURKOWSKI. The same arguments are being fought that were being fought on that, and that was Congressional action that the Vice President broke the tie on it. It was that close a vote not to having the Prudhoe Bay field brought in.

Well, I just find it an extraordinary circumstance that reality dictates that the American public respond to a crisis, and if we had a crisis we would have support for exploration on domestic reserves.

Mr. Chairman, I do have an opening statement that I would like to have presented as if read in the record.

The Chairman. Yes, that will be received in the record.

Senator MURKOWSKI. It does address the issue, as you might expect, of ANWR.

I thank the gentlemen for their testimony, and your particular comments with regard to ANWR. I wonder if there is anyone who would care to comment on the appropriateness of ANWR and their own evaluation of our energy needs, and then I will conclude my participation, I promise.

Dr. JONES. Let me give it a try, Senator.

I spent a number of years with Atlantic Richfield Company, who was a principal on the North Slope of Alaska. My experience during those years when we were developing the North Slope was there is absolutely nothing that lies between an environmentally sound production program, not to mention exploration program, that cannot be handled with regard to the wildlife preserve in the North Slope of Alaska.

Everything that needs to be done has already been done once. Everything that needs to be—and that is from a production standpoint, not just an exploration standpoint. Furthermore, the work that is being done offshore California lends further credibility to the environmental sensitivity of the oil and gas companies to issue such as that in the wildlife preserve.

If nothing else, the government could play a strong hand in supporting a series of exploration wells to be drilled in both the wildlife preserve and other areas on Federal lands around the country as an exhibit well, if nothing else, to demonstrate that (a) there is oil there, and (b) we did not kill any snail darters or inhibit the breeding of caribou.

Senator MURKOWSKI. Thank you.

Dr. DREYFUS. My experience with the wildlife refuge was as Eskimo Scout Company Commander, and it did not go to the point of oil. I am not sure what I think about it.

Senator MURKOWSKI. Did you take your share of caribou?

Dr. DREYFUS. Not on the wildlife refuge, no, sir. [Laughter.]

Senator MURKOWSKI. I thought maybe at that time it was fair game.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, very much.

I would like to put in the record at this point a letter from the Americans for Energy Independence dated March 2, 1987, and signed by Elihu Bergman, the Executive Director.

[The letter referred to follows:]

americans for
energy independence

Chairman of the Board Dr. Hans A. Bethe
Chairman, Executive Committee Mr. Vincent A. O'Reilly
Executive Director Dr. Elihu Bergman

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MR. JOHN E. GRAY, President
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NUS Corporation
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Congresswoman MARILYN LLOYD
Congressman PHILIP SHARP
Congressman MIKE SYNAR

March 2, 1987

Honorable J. Bennett Johnston
Chairman
Senate Energy and Natural
Resources Committee
Room SD-364
Washington, DC 20510

Dear Mr. Chairman:

Ever since the nation was first shocked out of our energy innocence in the mid-1970's, **AMERICANS FOR ENERGY INDEPENDENCE** has sought to focus attention on policies and actions that would prevent a repetition and provide a buffer against future energy vulnerability. Paramount among such actions has been the creation of a climate and provision of incentives for substituting domestic resources -- coal; natural gas; and nuclear power -- for oil wherever possible. Along with the major conservation and efficiency gains the country has experienced in the past 13 years, the introduction of these domestic energy resources was a major factor in reducing U.S. oil consumption, and cutting our imports in half.

Even with these gains, we have not yet created a secure national energy system -- one that is insulated from the particular economic and political interests of other countries. And there is increasing evidence that the progress we have made could be seriously jeopardized by declining domestic oil production. Oil remains the weak link in our energy system. (Our concerns about this issue are expressed in the enclosed paper: **AN UPDATE ON THE OIL PRICE COLLAPSE: WHERE ARE WE HEADED?**)

Given the disturbing signs on the horizon, and the critical stakes in a secure energy future for the nation, we need to work now on actions that will improve our prospects. During this session, the Congress will be considering a number of measures to do so. Already, you have enacted legislation that sets uniform efficiency standards for significant appliances. This action is a reaffirmation of your commitment to conservation, and hopefully we will see more of the same.

1629 K Street, N.W. • Washington, D.C. 20006-1619 • (202) 466-2105

There are also proposals for a clean coal program, that would expand opportunities for coal consumption; nuclear licensing reform that would facilitate a continuing role for nuclear power in meeting the growing national electricity requirements; and proposals that would open potentially valuable areas for critical oil exploration.

One of the issues your committee will be addressing in the near future is the removal of limitations on the selection and use of natural gas. APEI has supported a measure of this sort for several years because of the abundance of natural gas in this country, and the important role it can play as a substitute for oil. Current restrictions on natural gas use are an anachronism, imposed at a time of perceived shortage. We have since learned that there is no shortage, but rather an abundance.

We would be most pleased if you viewed the enclosed paper as worthy of inclusion in the record of your March 11 oversight hearings.

As you look at the natural gas issue, we are confident that you and your associates will do so in a total energy perspective, and consider the value of an action that will provide another instrument for the achievement of real energy security.

Sincerely,

Elihu Bergman
Executive Director

AN UPDATE ON THE OIL PRICE COLLAPSE: WHERE ARE WE HEADED?

By Elihu Bergman
Americans For Energy Independence
Washington, DC

AN UPDATE ON THE OIL PRICE COLLAPSE: WHERE ARE WE HEADED?

by Elihu Bergman

The oil price collapse of 1986, which created a new set of conditions for the world energy outlook, has not spent itself. It is unlikely that the oil market will look much different during 1987 despite the psychology-driven price increase that optimistically followed in the wake of OPEC's December price/production accord. This is because the fundamentals that created the price collapse and its aftermath are still in place, and are not overridden by euphoria alone.

These fundamentals for the time-being continue to act as the principal determinants of supply and prices:

1. Demand has not caught up with supply. For the time-being, the oil producers of the world -- OPEC and non-OPEC -- have more oil to sell, and need to sell it, than the world needs from them.

2. The differential economic and political needs of the oil-producing countries create clashes of interest that cannot be reconciled by an agreement to share a limited market. These conflicts of interest produce a condition of every man for himself, with competition among the suppliers to sell in a glutted market.

3. The major oil exporting countries historically have not succeeded in achieving a collective discipline; they have never played by the rules they have set for a sustained period.

4. The major oil-consuming countries have built up substantial inventories in response to the attractiveness of bargain basement oil prices in the summer of 1986. These inventories create another competitive source of supply, which could surface at the end of the high-demand winter heating season.

Under the circumstances, it is not likely that the OPEC countries will be able to maintain an average price of the price of $18 a barrel during 1987. While fluctuating prices have hit levels above the $18 peak, they have fluctuated back down again. And there is a noticeable consensus among authoritative analysts that this fluctuating market will continue during 1987, with prices ranging between $14-18 a barrel, depending on seasonal and market conditions.

But already the ripples of a 50% cut in oil prices are affecting the U.S. energy system (less so the systems of other industrial countries.) Oil consumption continues to climb from the 1983 bottom, and during 1986 reached new highs. Gasoline accounts for more than half of U.S. oil requirements, and in the first 9 months of 1986 gasoline demand was up 3% over the comparable period in 1985. In the four weeks ending Oct. 17, with the summer driving season already finished, gasoline consumption was up 6% over the same interval in 1985. And the demand for jet fuel for the airlines during 1986 has increased by 10% over 1985.

Along with the consumption increases, there have been sharp hikes in oil imports during 1986. The average level of imports for the 10 month January-October interval is up about 25% over the corresponding period in 1985. And during some 4-week periods oil imports increased by as much as 50% over 1985. Granted that some of this import surge reflects a replenishment of inventories at bargain basement prices offered by the Saudis and other aggressive marketers during the summer, but it also is a response to the increased demand. And the United States not only was importing more oil, but most of the increase came from the Persian Gulf, which long has been regarded as the most vulnerable import source.

In addition to more driving and more flying, there was a reversion back to oil from alternatives in electricity generation. By 1985 oil had been reduced to an insignificant source of U.S. electricity generation. From 1979 when oil fired electricity peaked at about 1.5 million barrels a day (accounting for 17% of electricity generation), the entry of new nuclear and coal generating plants reduced oil usage to about 400,000 barrels by 1985 (down to 4% of total generation.) Placed in a global perspective, this reduction in the U.S. electricity sector alone is the equivalent of more than 80% of the total oil requirements of major industrial countries such as France, Italy, the U.K., and Canada.

But during 1986, this decline in oil use turned around. In the first quarter of 1986 oil fired electricity increased by 49% over the comparable 1985 period. The three census regions that account for 88% of U.S. oil-fired electricity all contributed to the reversal: Oil use in the New England region was up by 42%; in the Mid Atlantic region by 30%; and in the South Atlantic by 140%. These increases came principally at the expense of natural gas, with some decline in coal use in New England.

In the total picture of U.S. oil consumption, these hikes in oil use in response to lower prices do not account for a major addition in 1986. But they could in the future. U.S. electricity demand is conservatively projected to grow at a steady annual rate of about 3%. This growth coupled to the routine replacement of obsolete generating plants could create a requirement for a 50% addition to existing generating capacity in the 90's. If the new plants are built to use oil, oil-fired electricity could return to the 1979 peak -- and then some.

The supply side of the U.S. oil equation also has registered a sharp response to the price collapse. In 1985, U.S. domestic oil production accounted for nearly 75% of total consumption; up from 50% in 1979. After hitting a peak in 1985, domestic oil production was down by 1.8% during the 10 month period from January-November 1986. In itself this reduction does not appear to be significant, and theoretically would be reversible. But it does not fully reflect the production declines that result from the closure of many stripper wells in the oil-producing states, which the price declines have rendered uneconomical.

In terms of future U.S. production, the decline in actual 1986 production is not significant, and theoretically even is reversible. But for future production, the dramatic decline in oil exploration activity, and prospects for maintaining U.S. oil reserves, is more critical. The number of drilling rigs in operation is the key measure of what oil producers expect from the marketplace, and in 1986 these expectations plummeted. In December 1985 there were 1950 rigs in operation on and off shore. By July 1986, drilling activity shrunk to 686 rigs -- a decline of 65% in six months. U.S. drilling activity peaked in 1981, likewise in response to expectations about oil prices, at 3970 active rigs. From that peak, the December 1985 level represents a 51% drop; and the July 1986 figure a decline of 83%.

Given the fickleness of oil exploration, the failure rates, and the considerable lead times required for bringing successful finds to market, the record for domestic oil exploration in 1986 cannot be encouraging, neither for prospects of maintaining the advantage the United States has enjoyed in a buyer's world oil market since 1982, nor for continuing to deprive the OPEC producers of the price-setting power that has eluded them since 1981.

Even before oil prices started to unravel in early 1986 there were some early warnings from respected sources about U.S. prospects for the 90's. During 1985 the Congressional Research Service and the U.S. Geological Survey projected declines in U.S. domestic oil production by as much as 50% by the year 2000. CRS and USGS were looking at actual physical availabilities -- whether there was any oil out there. During 1986 more projections emerged from authoritative oil industry sources, that looked at the impact of low prices on capturing physical availabilities that might well be out there. These forecasts came out of the American Petroleum Institute; CONOCO; Shell; and BP, and they too projected major declines in U.S. production by 2000. Looking at both the physical prospects and price incentives, the Department of Energy and the Gas Research Institute came out with comparable projections of production declines.

These projections are replete with varying assumptions and qualifications. And the landscape of the past thirteen years is cluttered with energy projections from authoritative sources gone awry. (One that most of the experts agreed on in 1981 was that oil would cost $50 a barrel and climbing this year.) But this time a common concern about the decline in U.S. oil production is based on an assessment of physical and financial evidence that is more deeply rooted in experience.

However valid these projections, their bottom line suggests hard times ahead for the United States, the other major industrial countries, and especially for the underdeveloped countries, with 75% of the world's population, whose fragile economies were savaged most brutally by the oil price shocks of the 70's and early 80's.

Because the United States is the world's largest oil consumer, U.S. behavior in the oil market is the major determinant of market conditions. Thus, if U.S. domestic production declines by 50% and consumption stays level in the 90's as the authorities suggest, the United States will have to compensate the shortfall with imports at the rate of 4 million barrels per day over today's import level. The additional requirement for foreign oil would restore U.S. imports to their historic 1978 peak of about 8 million barrels per day.

This U.S. requirement alone could be the major factor in restoring a seller's oil market, like the one that existed until 1982. It is estimated that an additional 6 million barrels a day in demand would satisfy all the oil current earnings requirements of the OPEC countries. (An increase of this size would raise OPEC production to 22-23 million barrels a day.) Any requirement from OPEC above this level would restore their discretion over production and prices -- they could produce if they wish and charge whatever the market would bear. This is where OPEC and the consuming world left one-another in 1982.

With the United States providing 4 million barrels of this target, an additional 2 million could be generated by the collective requirements of other consuming countries -- the industrial countries; the rapidly-growing underdeveloped countries; and the communist countries, whose energy and oil requirements continue to increase.

While the short run prospects determined by the advantages of a buyer's oil market look good for the United States, the longer term outlook is ominous. The respective time frames of short and long term are not definitively established, but most of the authorities see lower price ranges for 18-24 months, and some to the end of the decade. As for the long term, there is agreement among all those who have attempted to depict it that the advantage will shift to the oil producing countries by the end of the century, which is only 14 years away. And given the time frames for accomplishing any meaningful energy results, what happens in 14 years will have to be started within the next two years.

With the stakes and urgencies involved, there obviously is a job for public policy in the developed industrial countries which account for 75% of the world's oil consumption. The central target needs to be a maintenance of oil consumption and production at the current levels, which have created the buyer's market. Doing so requires intervention in a marketplace that currently signals increased consumption and decreased production.

It remains to be seen whether the political leadership, particularly in the United States, responds to this requirement. Because whether they do, and how soon -- not the workings of the marketplace -- will be a principal determinant of the U.S. energy future.

END

(Dr. Bergman is Executive Director of AMERICANS FOR ENERGY INDEPENDENCE, a Washington-based policy and education organization.)

January 1987

The **CHAIRMAN**. Gentlemen, let me thank you very much for your testimony. It was good to have you back.

The hearing is adjourned.

[Whereupon, at 12:26 p.m., the hearing was adjourned.]

[Subsequent to the hearing Dr. Jones submitted the following:]

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Chase Econometrics

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We are proud to announce the formation of a new company, WEFA-CEIS. We have merged with Wharton Econometric Forecasting Associates to create the premier economic information company. We are no longer affiliated with The Chase Manhattan Bank.

April 3, 1987

The Honorable J. Bennett Johnston
Chairman
U.S. Senate
Committee on Energy and Natural Resources
Washington, DC 20510

Dear Senator Johnston:

Attached are my written comments to Senator Weicker's questions that you forwarded following my testimony in March. I enjoyed that morning's session and look forward to any opportunity to be of service in the future.

Sincerely yours,

Scott T. Jones
Vice President
Energy, Metals, and Materials

/kc

Enclosure

RESPONSE TO QUESTIONS OF SENATOR LOWELL WEICKER, JR.
BY SCOTT T. JONES, PH.D., WEFA-CEIS

Question 1. In your testimony, you indicate that price stability is more important to the domestic oil industry than any specific price for oil. Is this correct?

Yes, Senator, our analyses suggest price stability may be an extremely important factor in determining the long-run health of the oil market, both from the prospective of the oil producer and the consumer. Price stability, so long as the level of price is greater than a very low $10 to 11/Bbl, results in more oil production than a higher *average* price derived from an average of fluctuating oil prices. Volatile prices, such as $12/Bbl to $20/Bbl or more, that race ahead only to fall back unexpectedly, create havoc for both the producer and the consumer. The reasons why volatility leaves oil company management feeling helpless is complex, but the chief characteristic relates to the imbalance between expenditures and revenues received.

1. the oil industry requires lengthy lead times to target a drilling prospect, complete seismic work, drill exploratory wells, then develop an oil field. The complete cycle is several years and is comparable to other major investments in U.S. industry.

A decision to carry out an exploration and development program requires years of expenditures before the first barrel of oil is sold, if indeed oil is found in the first place. Unfortunately, the public perception appears to be that the cycle is quite short, or that oil is a commodity, easily obtained from secure sources of supply elsewhere in the world.

2. Our analysis of oil *use* suggests that consumers respond favorably to stable oil prices, whether the level is $12/Bbl or as high as $20 to 22/Bbl. Over an 8 to 10 year time horizon, a stable crude oil price insures almost the same volume of overall refined oil product use, even though the crude oil price *level* is $8 or $10/Bbl higher than the low $12/Bbl case.

The key is stability. Consumers are able to plan, adjusting their use of gasoline and heating oil as incomes grow over time. Of course, there is a level where even stable prices result in substantially less oil use. For example, our tests suggest that stable oil prices at $30/Bbl, also in constant dollars, would re-ignite efforts to conserve fuels, engage in fuel switching, etc. The effect, after the same eight to ten years, is much less oil use.

Question 2. Important to buffering our country against an oil crisis is the maintenance of a domestic oil industry and the additions, or maintenance, of domestic oil reserves. What incentives would most directly spur the domestic oil industry in exploring and producing *new* wells and additions to our reserves?

The quickest way to guarantee reserve additions is through financial incentives that are derived directly by the oil companies with the best record for locating liquid hydrocarbons. To minimize the impact on Federal receipts/expenditures, a very attractive tax incentive, such as accelerated write-offs against drilling/exploration costs/depletion, targeting *new* activity is one possibility. But Congress *must* guard against the entry of "unskilled" or unqualified participants in the oil business. They would compete for rigs and crews, increasing inflationary pressures in that industry. Government incentives should be fashioned to reward success, not dry holes. I believe that the reporting system for verifying new discoveries is already in place, and could be adapted by the Bureau of Mines to act as a method of checks and balances.

Furthermore, given the abundance of natural gas in America, rewards for a successful hydrocarbon find should tend to favor oil, rather than a successful gas discovery. A differential rewards structure is needed to keep from enlarging the gas bubble that is already depressing that industry.

Question 3. Your testimony included reference of proposals to provide incentives made to worthy companies for replacing U.S. oil reserves. Please explain what incentives you were referring to? How would you identify the firms deserving of such incentives?

I suggest any set of incentives be fashioned as follows.

1. The incentives should be very generous, a 50% depletion allowance versus the historical 27%, for example.

2. The rewards should be fashioned competitively, rewarding success, not failure. The lure of keeping most of the incremental revenue from any new oil discovery will be received favorably by oil companies. They are a competitive bunch, with a great deal of confidence in their ability to locate hydrocarbons. If the rewards go only to those companies that locate oil, the nation will avoid a rush of unqualified entrants seeking a tax shelter. Financial institutions and other investors will tend to back the exploration companies with the best record, putting added financial clout behind the best of the lot.

Question 4. What would be the advantages inn imposing a fuels excise tax to promote drilling and domestic production compared to the enactment of an oil import fee?

Question 5. What disadvantages are there to imposing an oil import fee to support the domestic oil industry?

The advantage of an excise tax, say 25 to 30 cents/gallon on gasoline, is that it is relatively painless, given that:

(a) today's gasoline prices, adjusted for inflation, are still the lowest in decades, and

(b) the mechanism is already in place to collect the tax.

An import fee is saddled with a host of problems.

1. Which of our oil-exporting allies will be exempted from the fee?

2. A bureaucracy must be created to administer the program.

3. Does the fee apply only to crude oil imports? If so, look for a flood of refined product exports from the Middle East and other affected areas.

There are drawbacks to any excise tax. First, it is regressive, possibly requiring concessions for the aged and the poor. Secondly, to improve activity in the oil patch, it must be handed over directly, without the Government funnelling the funds elsewhere.

In that case, who do you give it to? Anyone that can drill a well? I refer you to my comments on the impact of any wholesale distribution of funds on the drilling industry. The cost of drilling will sky-rocket if new, unqualified entrants rush to line up for the redistribution of excise tax dollars.

Cost-*containment* and drilling *success* must both be part of any incentive program.